Step-by-Step Guide to Synchronous Volume Replication (Block Based) with Failover over a LAN Supported by Open-E® DSS™

DSS ver. 5.00 up62 May 26, 2009

September 2009

Synchronous Volume Replication with Failover over a LAN

	Replication Mode		Source/Destination			Data Transfer		Volume Type			
									iSCSI		
	Synchronous	Asynchronous	w/ System	LAN	WAN	File based	Block based	NAS	File-IO	Block-IO	FC
Synchronous Volume Replication with Failover over a LAN	✓			✓			✓			✓	

- Open-E DSS Synchronous Volume Replication with Failover is a fault tolerance process via iSCSI volume replication, that creates mirrored target data volumes.
  - Data is copied in real-time, and every change is immediately mirrored from the primary server to the secondary storage server.
  - In case of a failure, scheduled maintenance of the primary server, or loss of the primary data source, failover automatically switches operations to the secondary storage server, so processes can be continued as usual.

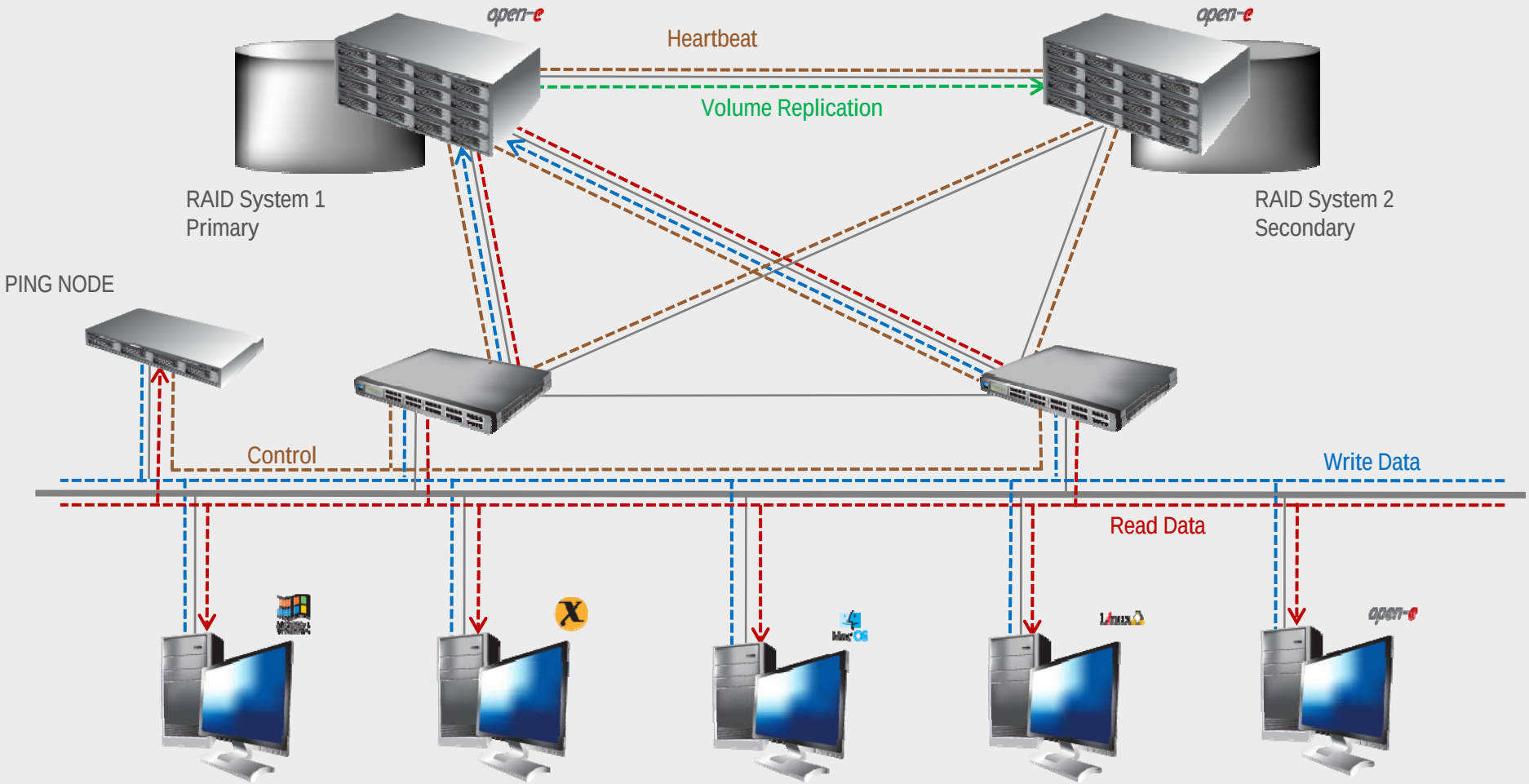
Synchronous Volume Replication with Failover over a LAN

VOLUME REPLICATION WITH FAILOVER BETWEEN TWO SYSTEMS WITHIN ONE LAN

- **Recommended Resources**
  - Key Hardware (two systems)
    - ✓ x86 compatible
    - ✓ RAID Controller with **Batery Backup Unit**
    - ✓ HDD‘s
    - ✓ Network Interface Cards
    - ✓ Ping Node (ping node it is any permanently (24/7) available host in the network. In particular case the ping node function can be performed by the server storing the data on the iSCSI failover volume).
  - Software
    - ✓ Open-E DSS, 2 units
- **Benefits**
  - Eliminate business disruption
  - Data Redundancy over a LAN
  - Switch Redundancy
- **Disadvantages**
  - High cost of solution
  - Natural disasters (earthquake, fire, flood...) can destroy local systems

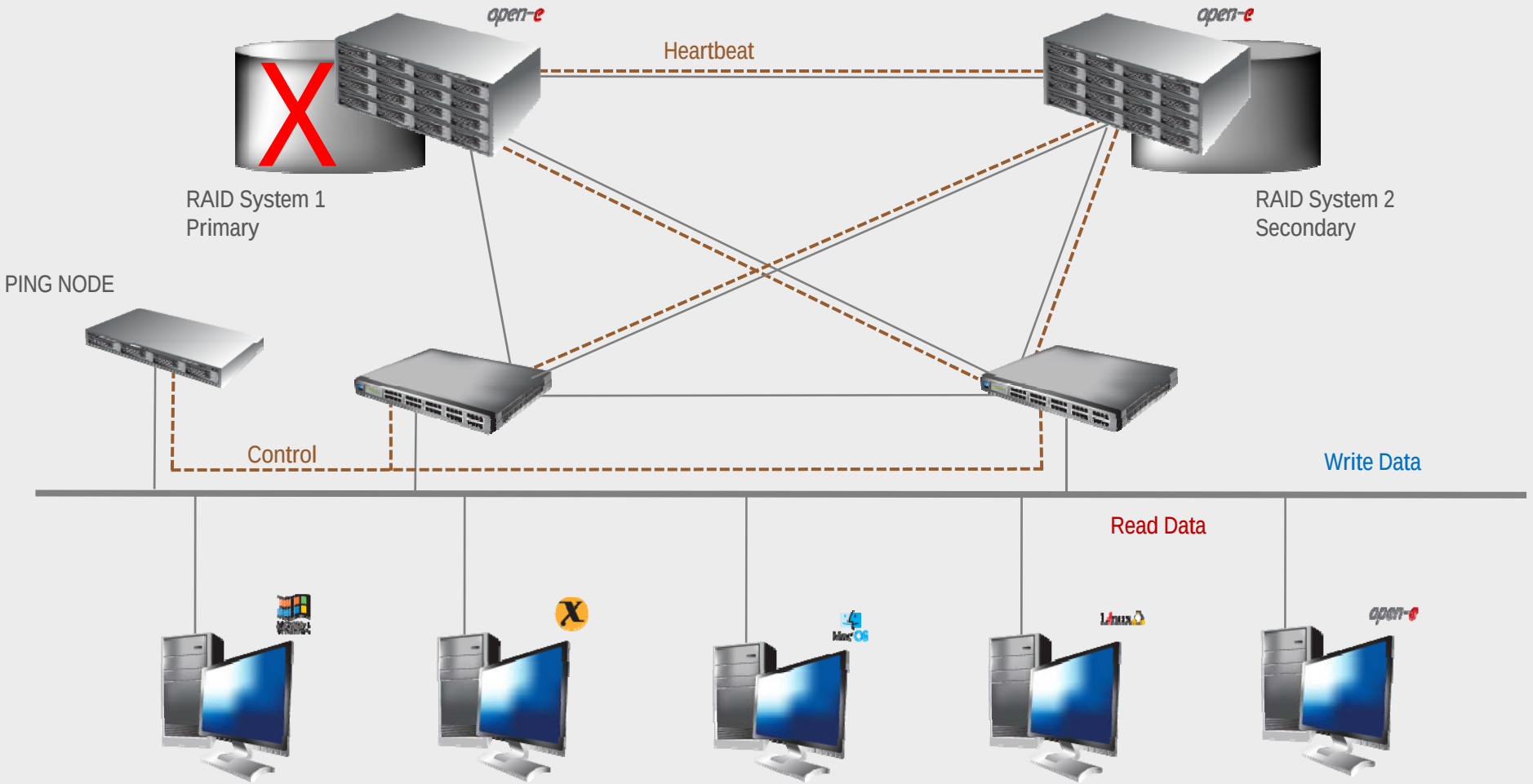
Synchronous Volume Replication with Failover over a LAN

- Data is written and read to System 1 (primary)
- Data is continually replicated to System 2 (secondary)



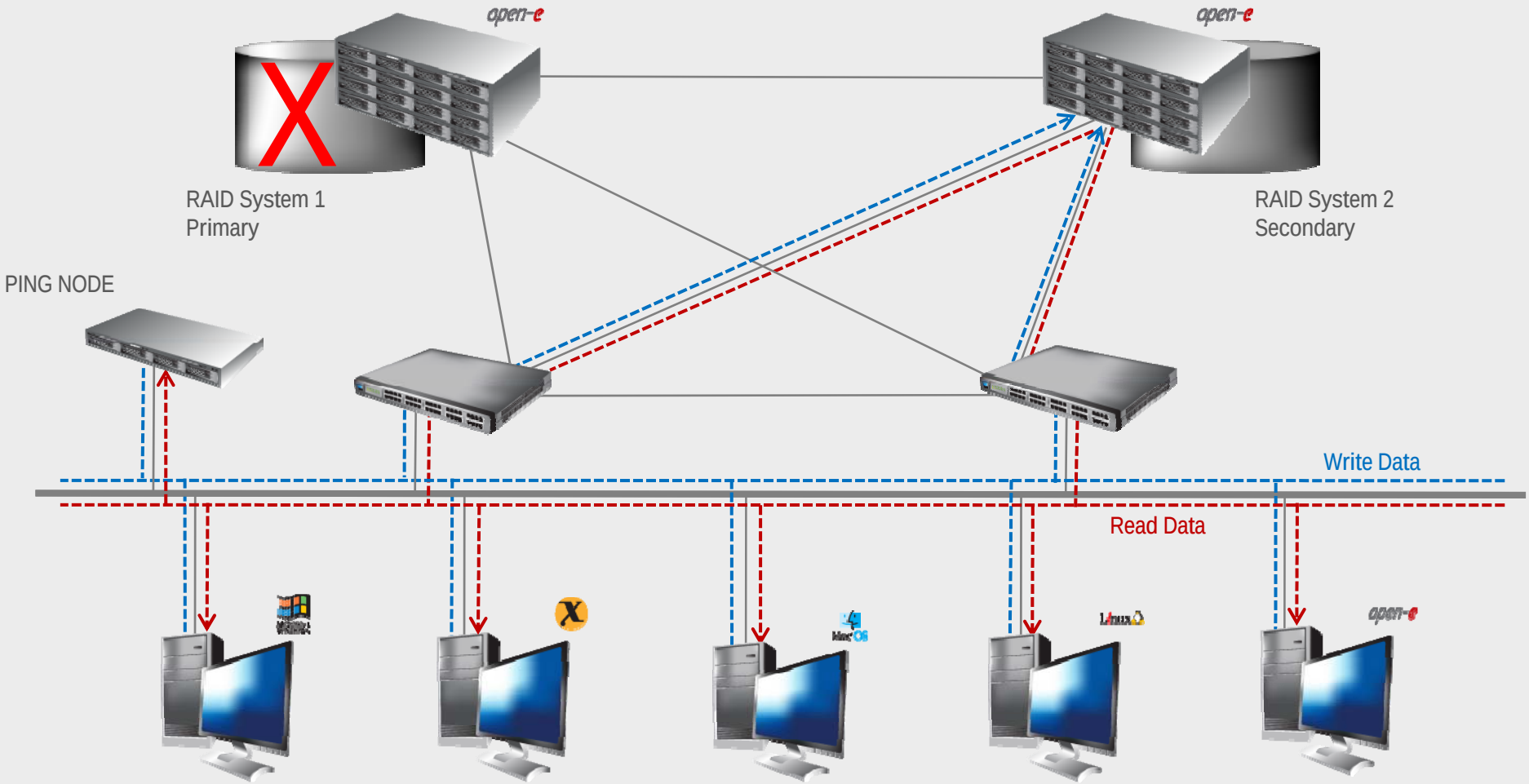
Synchronous Volume Replication with Failover over a LAN

- In case of raid array or disk drive error on System 1(primary), the server will send an e-mail notification to the administrator
- iSCSI Auto Failover determines there is no connection between the servers
- After a few seconds Automatic Failover is executed and users are switched to System 2 (secondary)



Synchronous Volume Replication with Failover over a LAN

- After switching, the replicated volume is available on System 2 (secondary)



Synchronous Volume Replication with Failover over a LAN

To set up Volume Replication with Failover, perform the following steps:

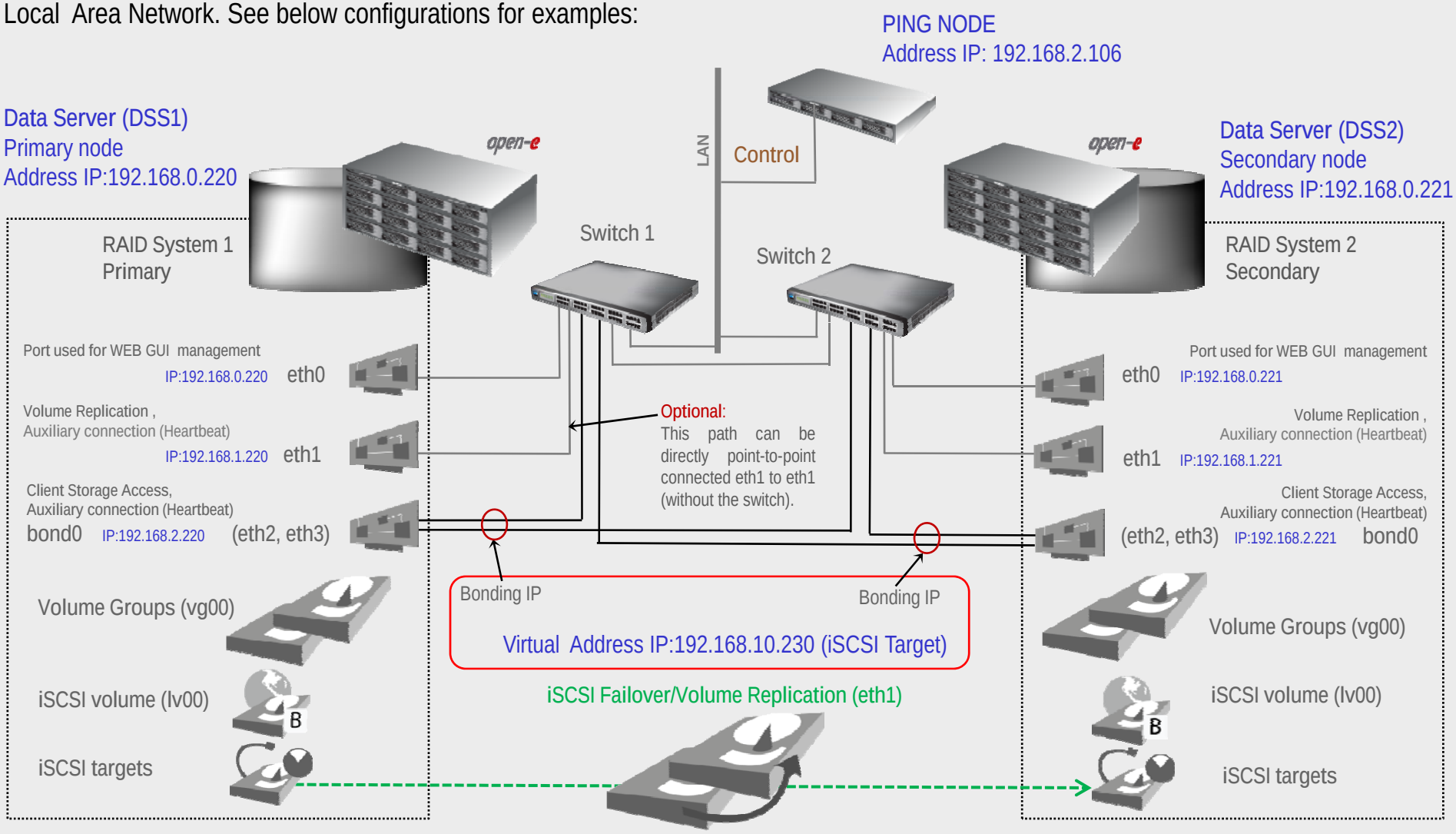
1. Hardware configuration:
   - Settings server names, ethernet ports and bonding on secondary and primary node
2. Configure the Secondary node:
   - Create a Volume Group, iSCSI Volume
   - Configure Volume Replication mode (destination mode) – settings mirror IP address
3. Configure the Primary node
   - Create a Volume Group, iSCSI Volume
   - Configure Volume Replication mode (source mode) – settings mirror IP address, creating Volume Replication task and start replication task.
4. Create new target on Secondary node
5. Create new target on Primary node
6. Configure virtual IP and Auxiliary connection
7. Configure iSCSI Failover
8. Start Failover Service
9. Test Failover Function
10. Run Failback Function

Synchronous Volume Replication with Failover over a LAN

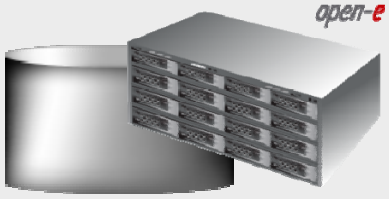
Hardware Requirements:

To run the Volume Replication with Failover, two DSS systems are required. Both servers must be located and working in the Local Area Network. See below configurations for examples:

1. Hardware Configuration



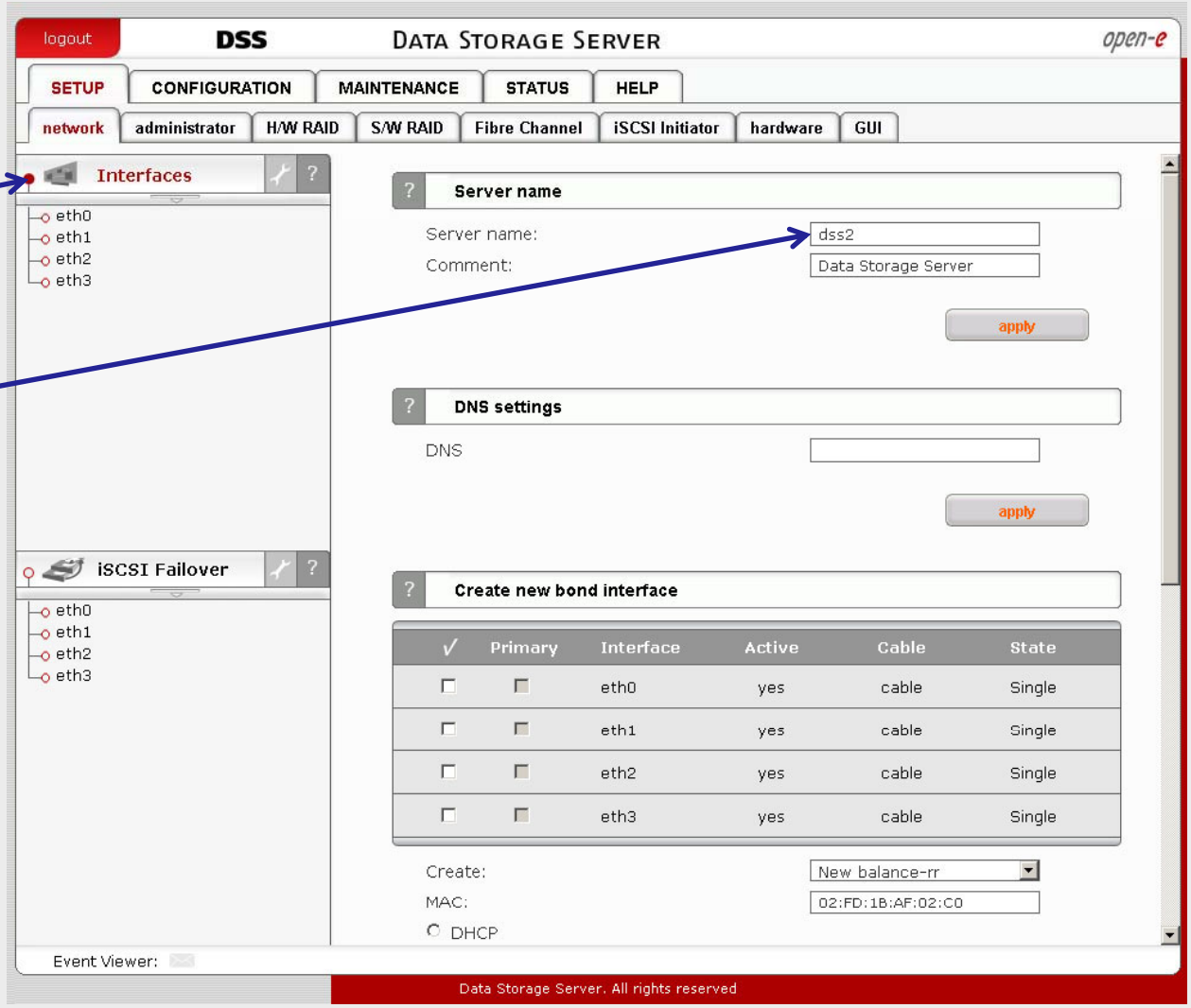
Synchronous Volume Replication with Failover over a LAN



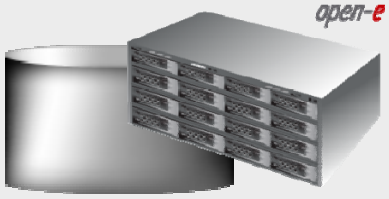
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

1. Hardware Configuration

After logging on the DSS please go to „SETUP" tab, „network" and „Interfaces". In „Server name" function enter Server name, in this example „dss2" and click apply button. (All connection will be restarted)



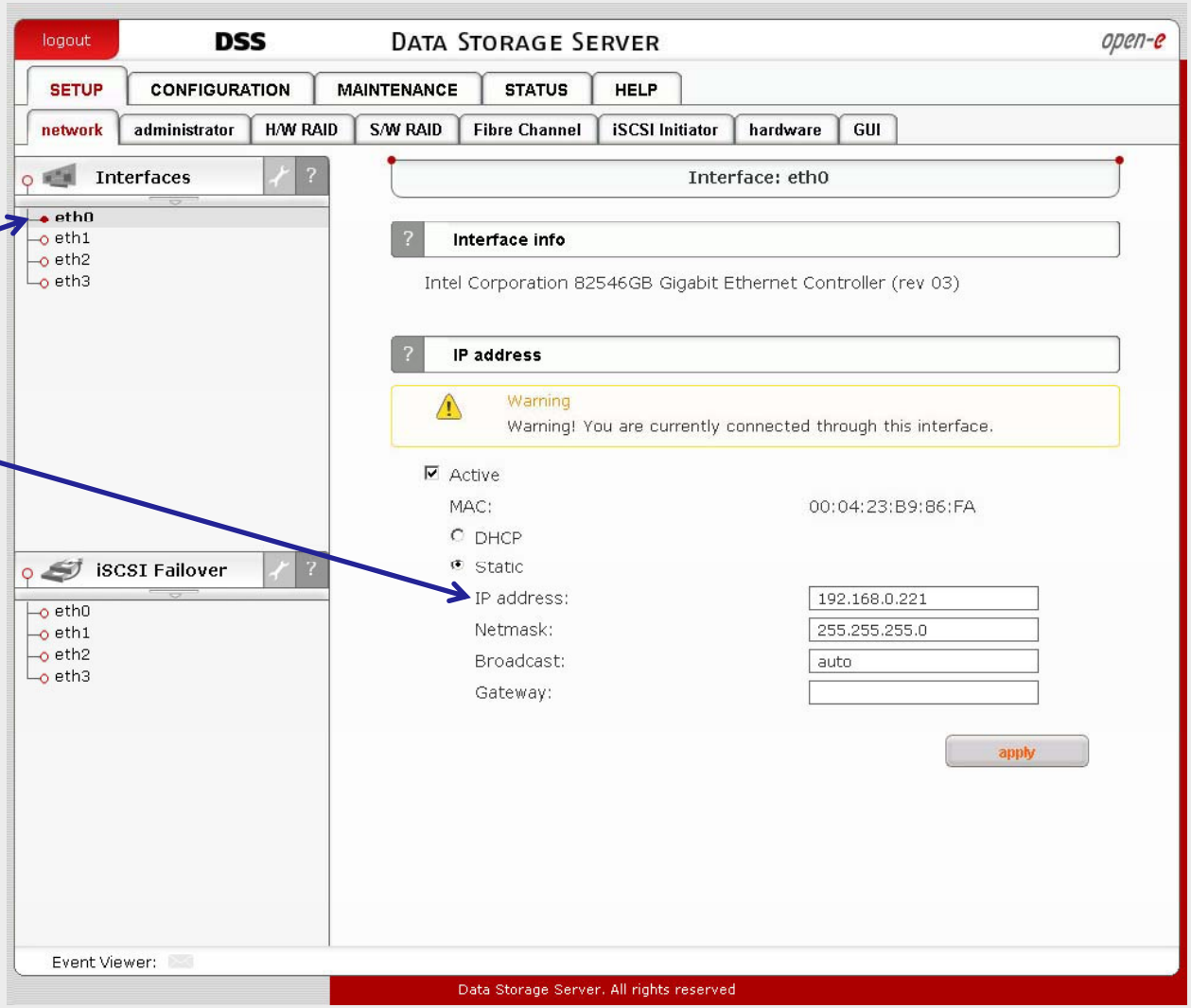
Synchronous Volume Replication with Failover over a LAN



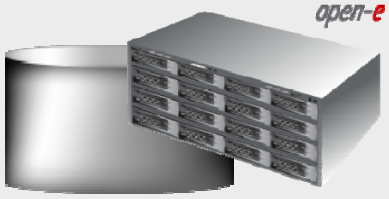
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

1. Hardware Configuration

Next select eth0 interface and change address IP from 192.168.0.220 in field IP address to 192.168 .0.221, and click apply button. (This will restart network configuration).



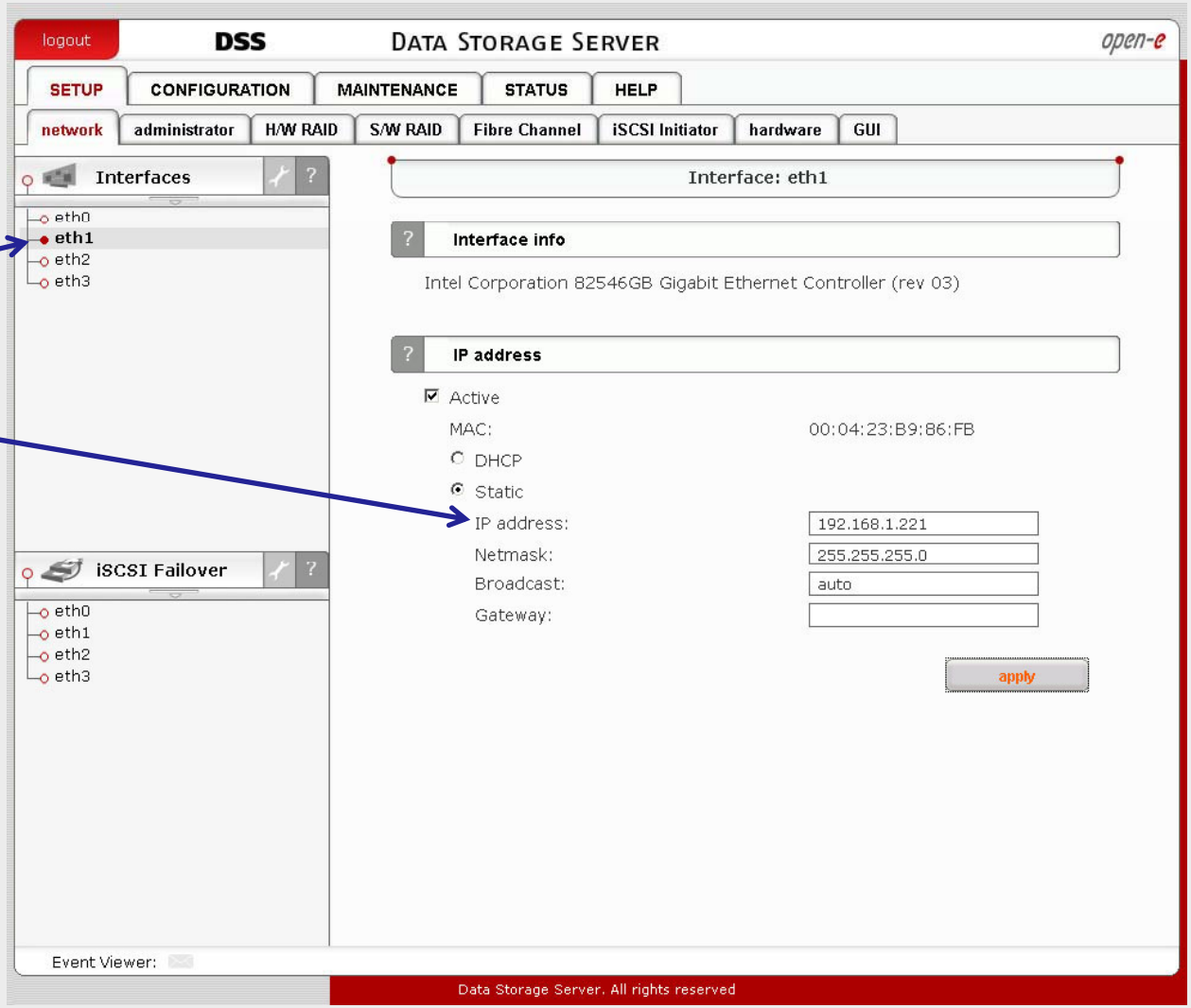
Synchronous Volume Replication with Failover over a LAN



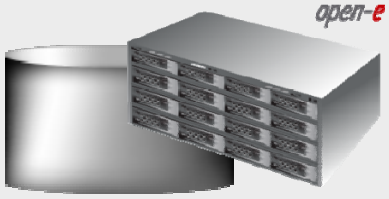
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

1. Hardware Configuration

Next select eth1 interface and change IP address from 192.168.1.220 in field IP address to 192.168.1.221 and click apply button.



Synchronous Volume Replication with Failover over a LAN

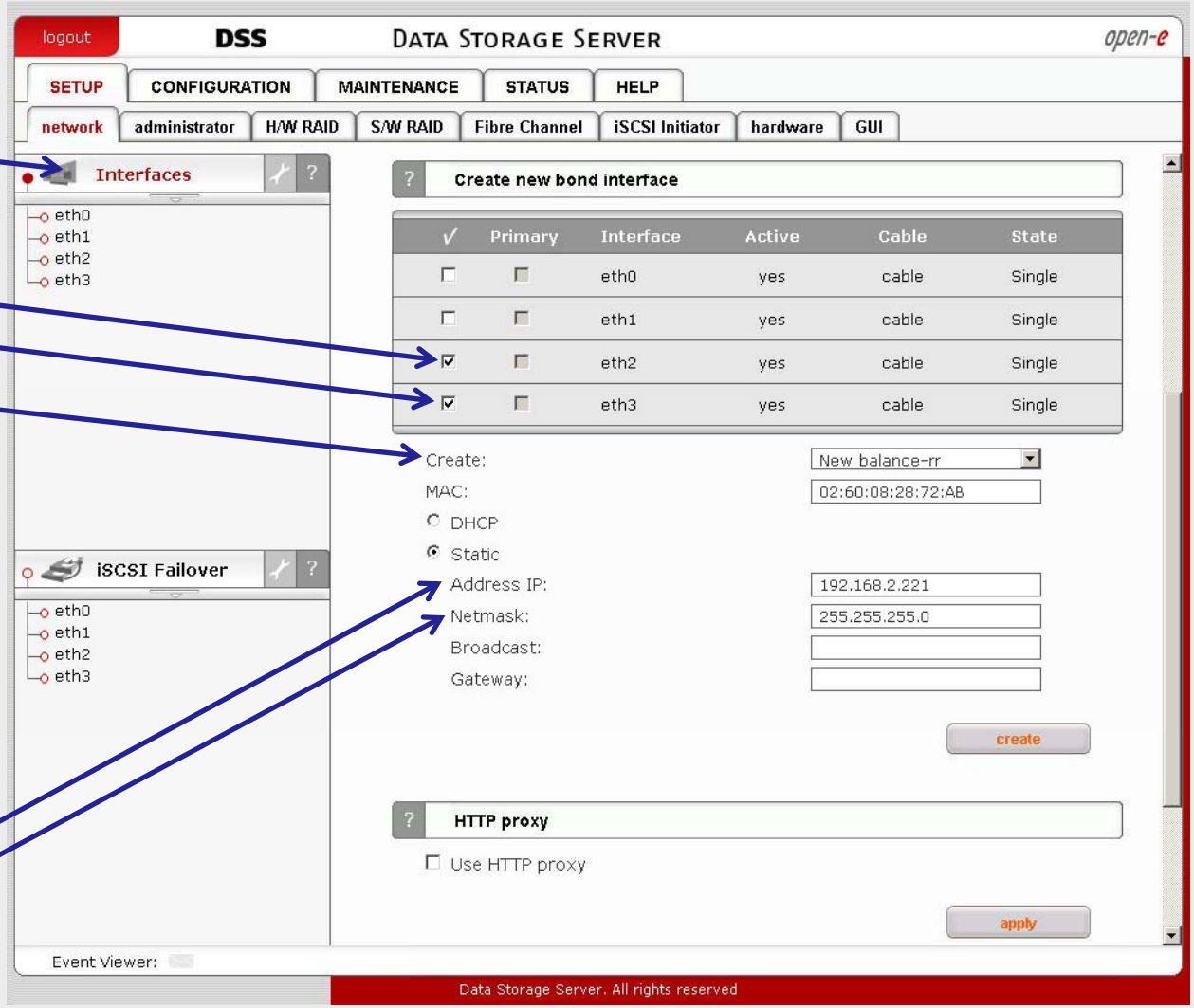


Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

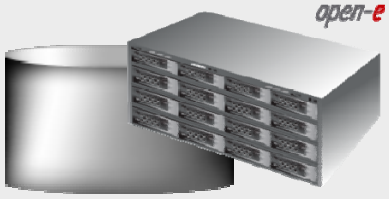
1. Hardware Configuration

Again select „Interfaces" and in Create new bond interface function check two boxes with eth2 and eth3. In field Create select bonding mode. In this example select New balance-rr.

Next enter address IP in field IP address 192.168 .2.221, Netmask, and click create button.



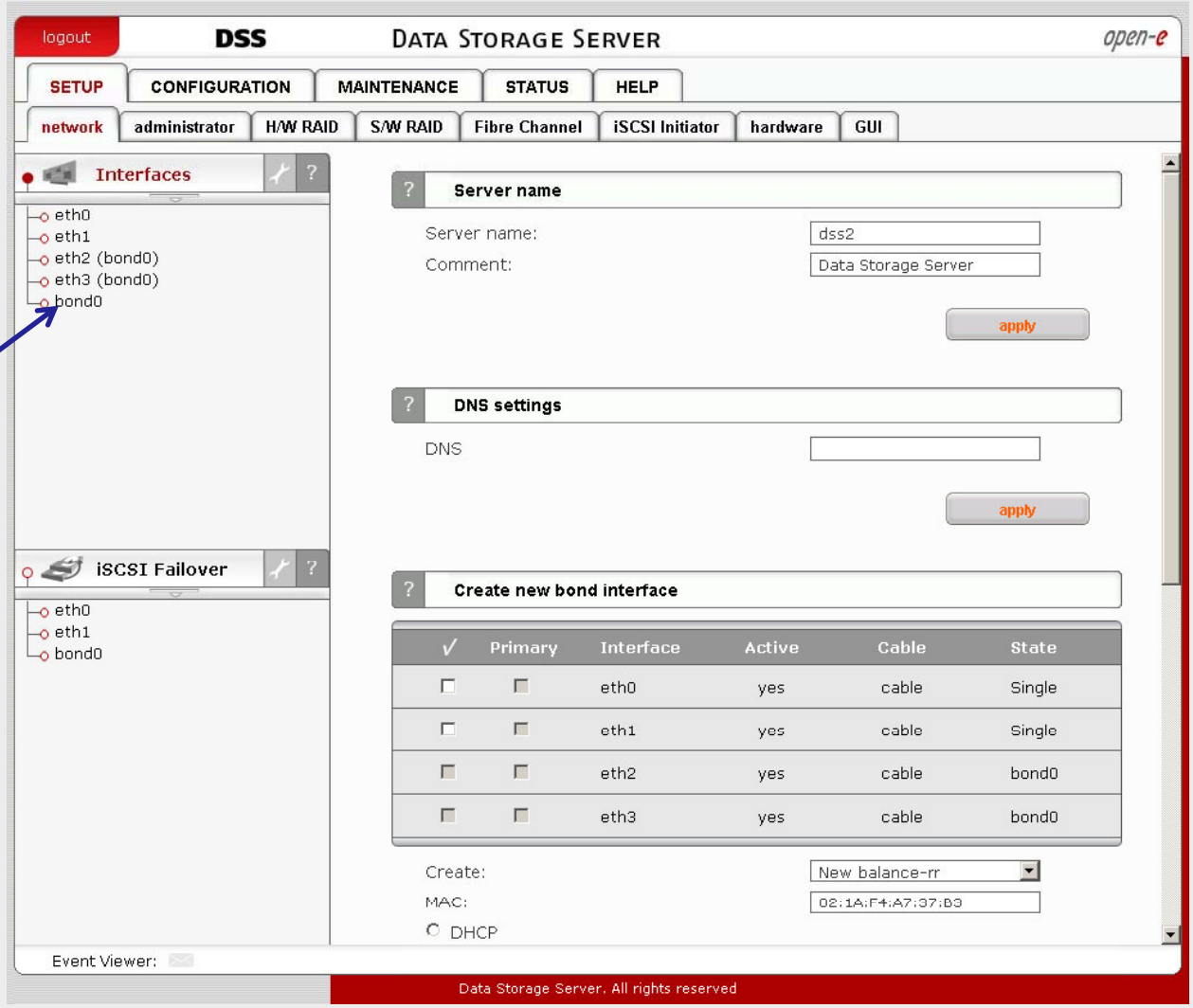
Synchronous Volume Replication with Failover over a LAN



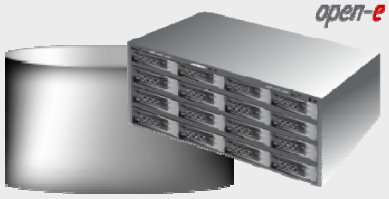
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

1. Hardware Configuration

After reloading page on the dss2 server you have configured bond0. Setting of the network interfaces on the secondary node is finished.



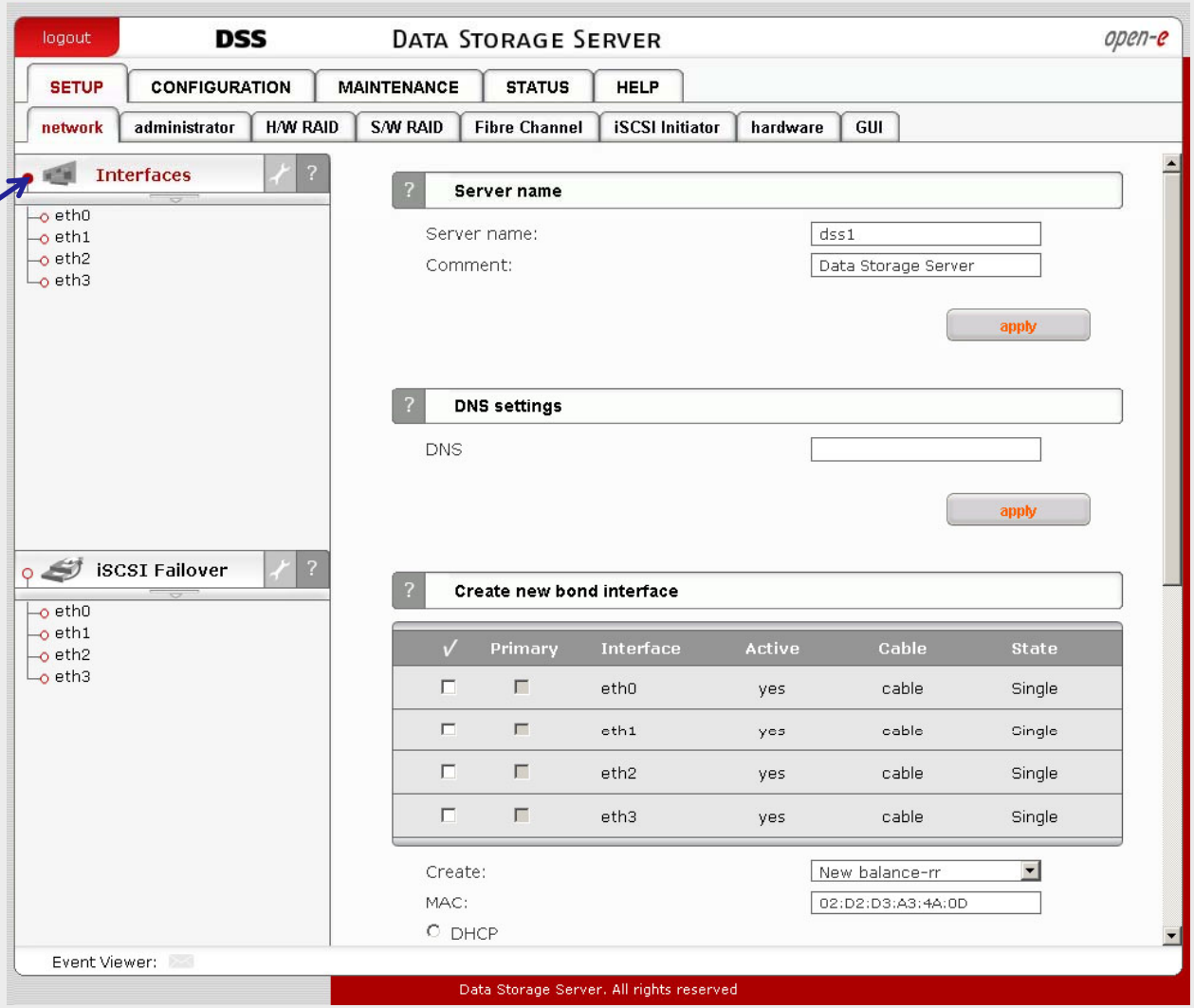
Synchronous Volume Replication with Failover over a LAN



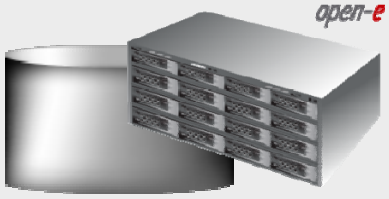
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

1. Hardware Configuration

After logging on the primary node please go to „SETUP" tab, „network" and „Interfaces". In „Server name" function enter Server name. In this example enter dss1 and click apply button. (All connection will be restarted).



Synchronous Volume Replication with Failover over a LAN

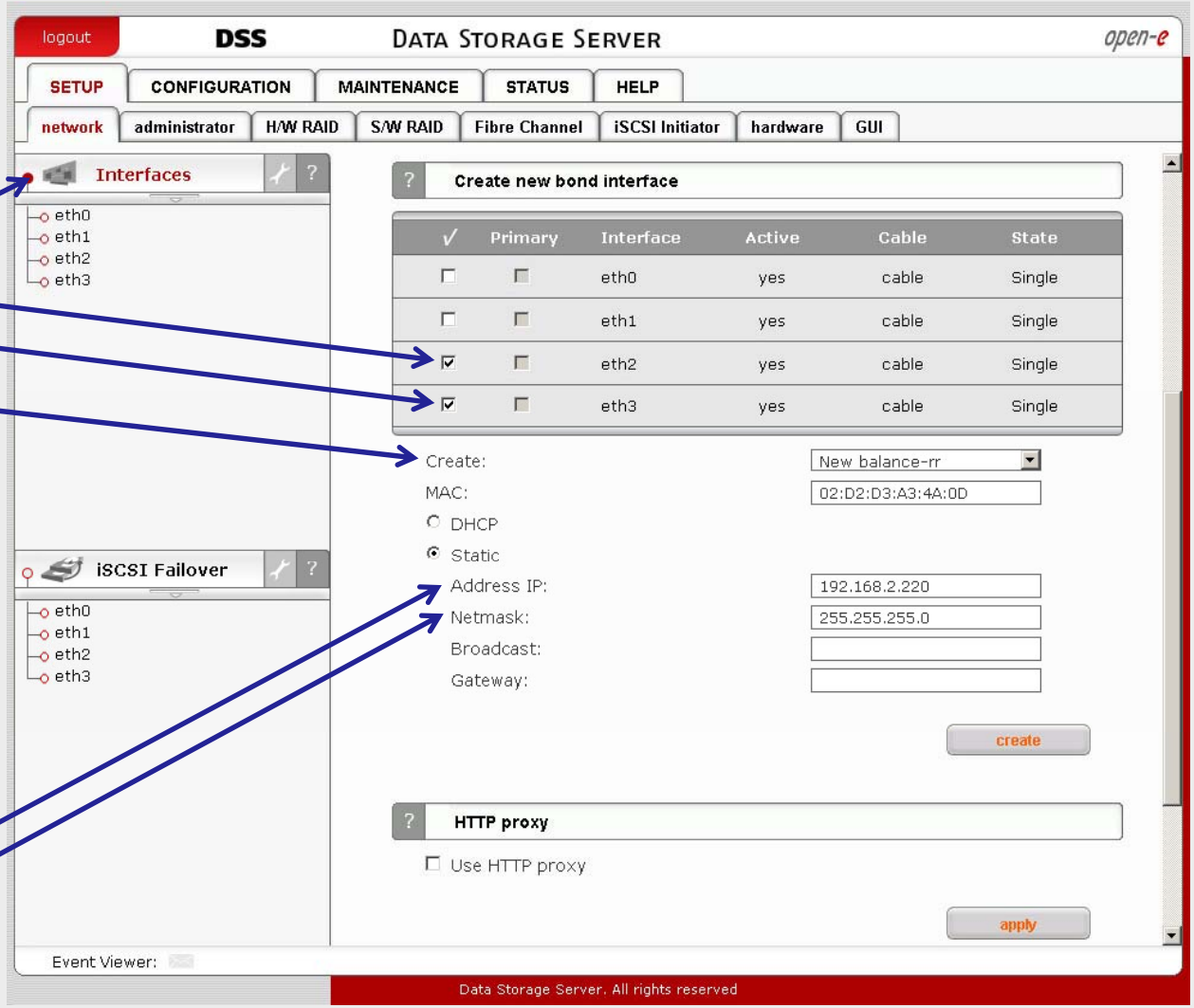


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

1. Hardware Configuration

Again select Interfaces and in Create new bond interface function check two boxes with eth2 and eth3. In field Create select mode for bonding. In this example selected New balance-rr..

Next enter address IP in field IP address 192.168.2.220, Netmask, and click create button.



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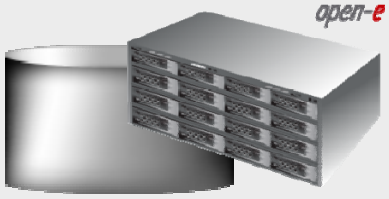
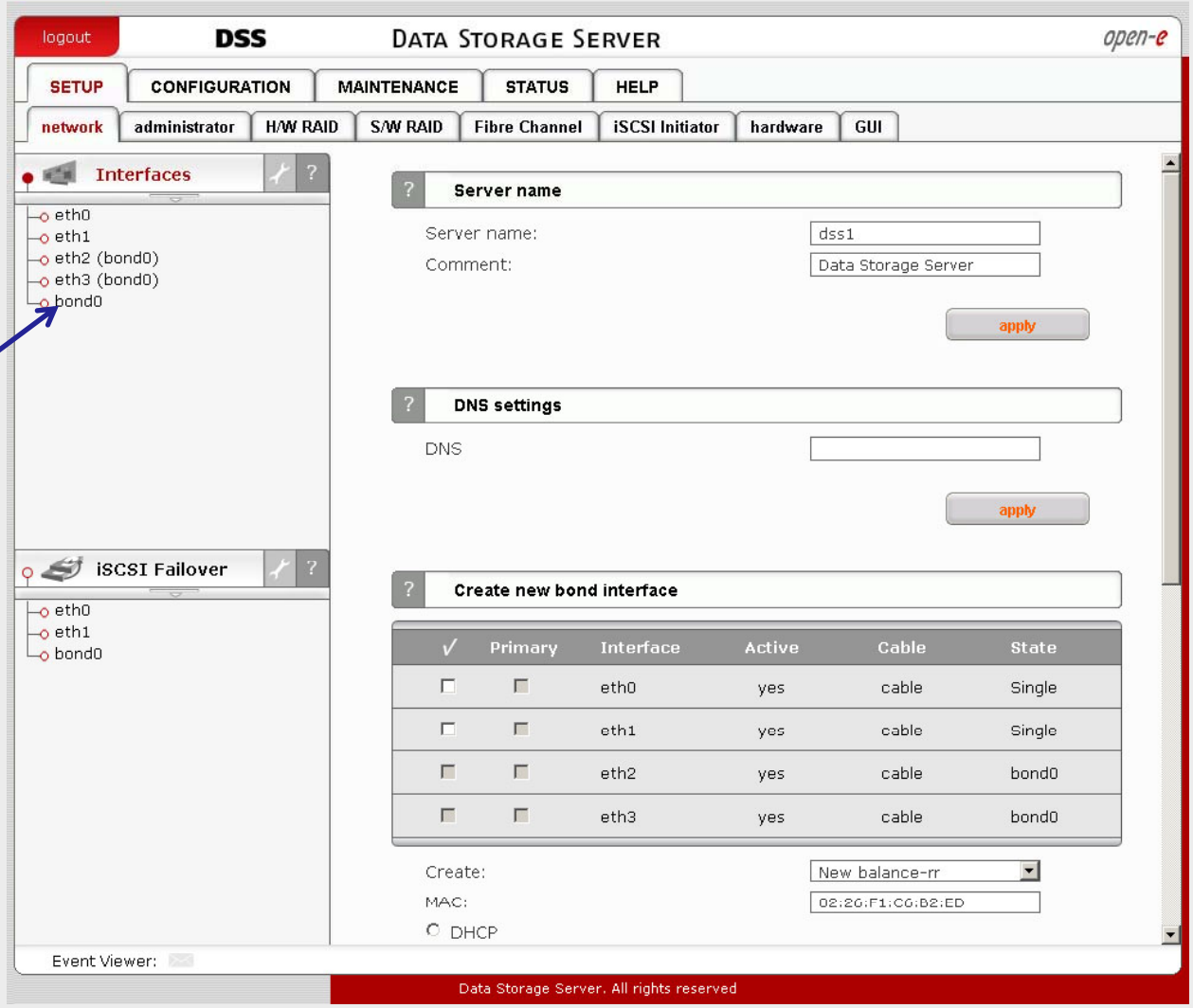


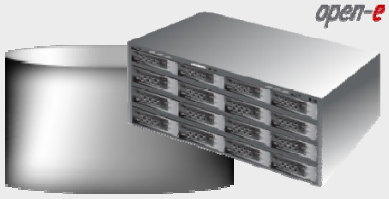
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

1. Hardware Configuration

After reloading page on the dss1 server you have configured bond0. Setting of the network interfaces on the secondary node is finished.



Synchronous Volume Replication with Failover over a LAN



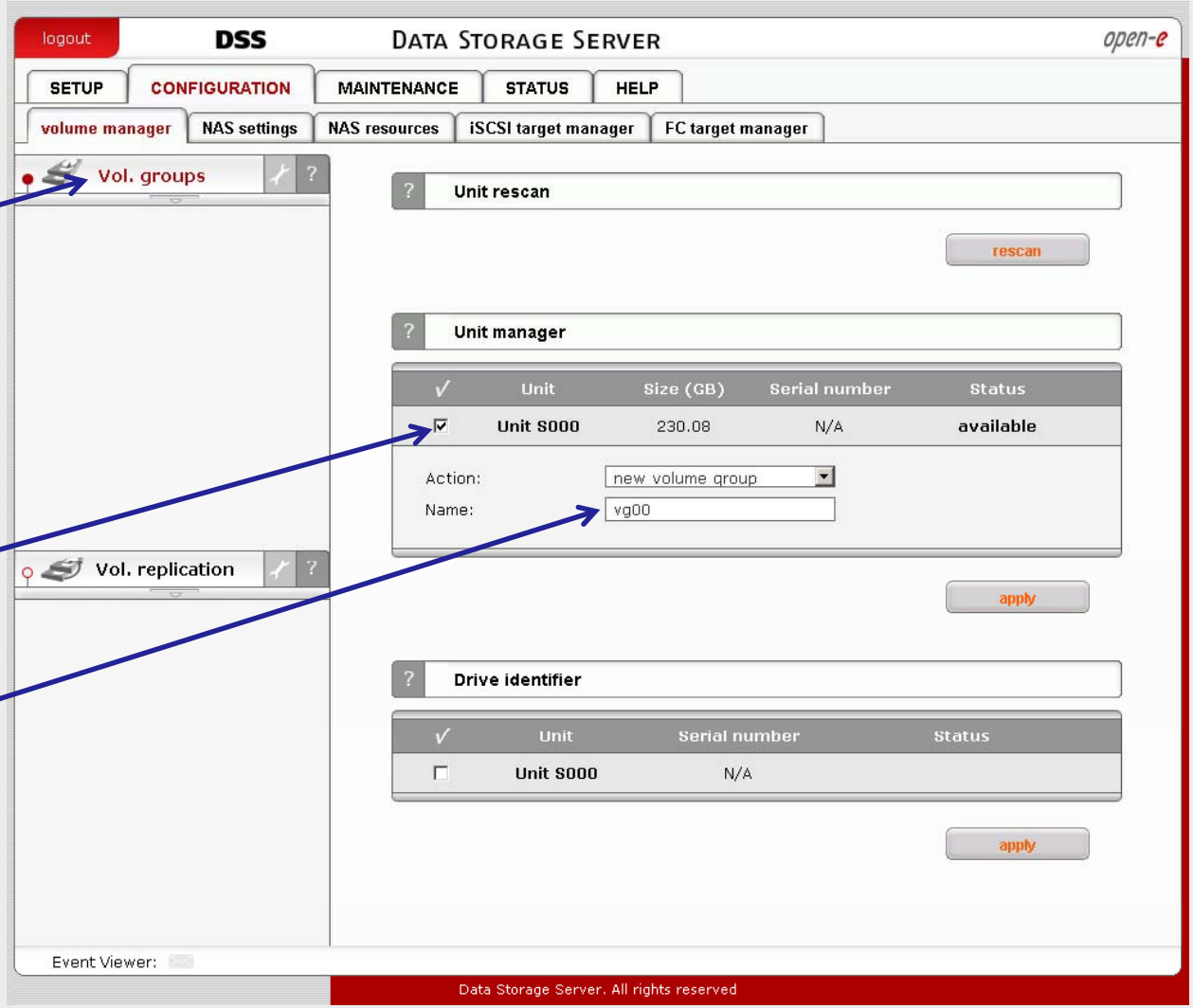
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

2. Configure the Secondary node

Under the „CONFIGURATION" tab, select „volume manager" and next Vol. Groups.

Volume Groups (vg00)

In Unit manager function add the selected physical units (Unit S000 or other) to create a new volume group (in this case, vg00) and click apply button



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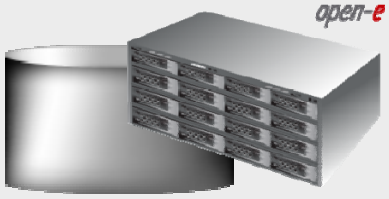


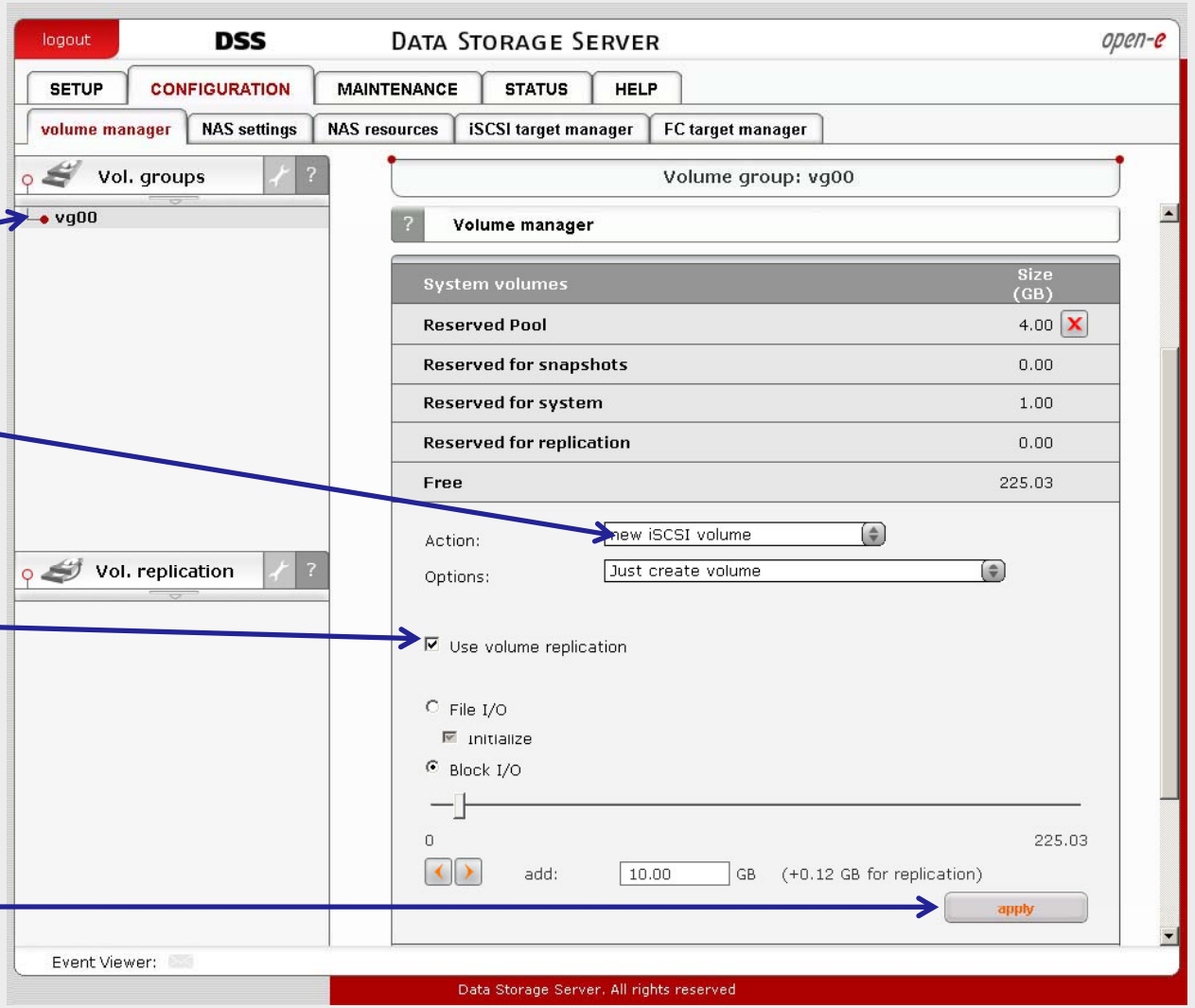
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

2. Configure the Secondary node

Select the appropriate volume group (vg00) from the list on the left and create a new iSCSI volume of the required size. This logical volume will be the destination of the replication process.

Next check the box with Use volume replication

After assigning an appropriate amount of space for the iSCSI volume, click the apply button



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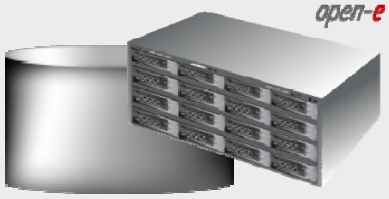
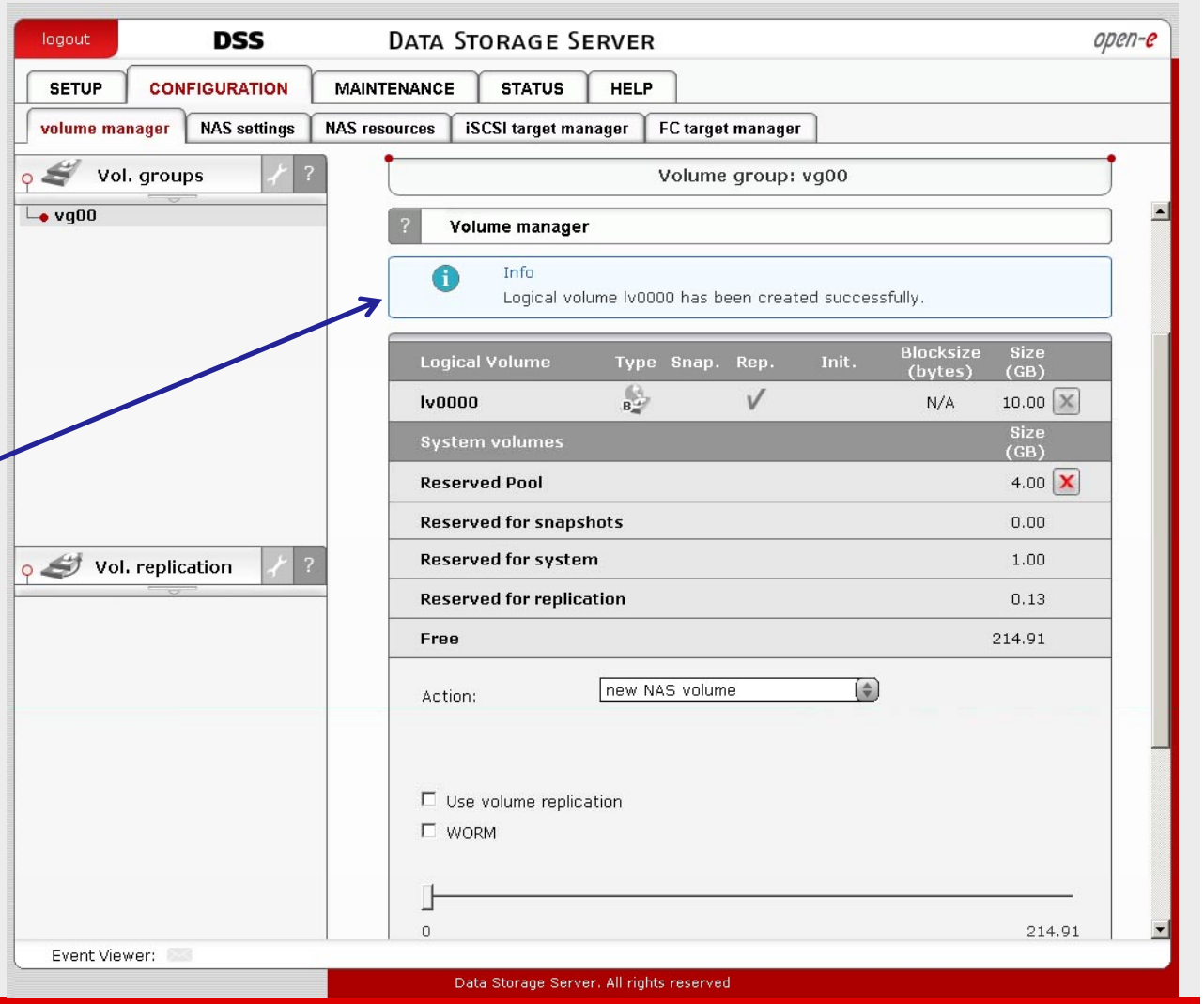


Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

2. Configure the Secondary node

The destination iSCSI Volume Block I/O is now configured.

iSCSI volume (lv0000)



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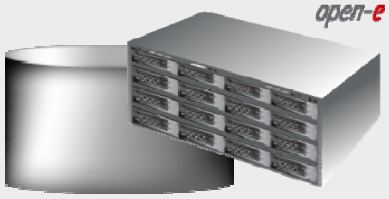
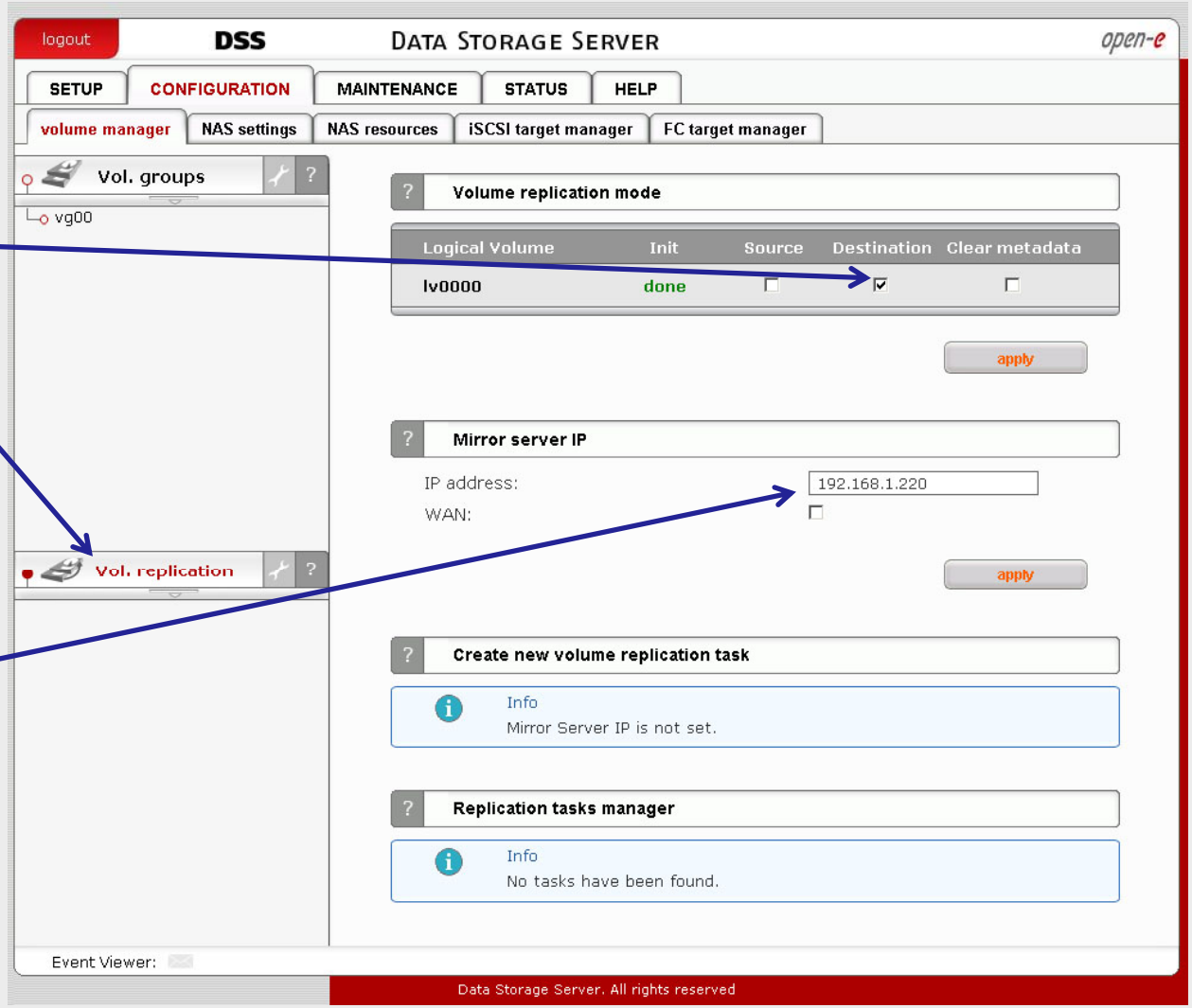


Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

2. Configure the Secondary node

Now, select the Vol. replication and check the box under Destination and click the apply button

Next, under Mirror Server IP function, enter the IP address of the Primary node (in our example, this would be 192.168.1.220) and click the apply button

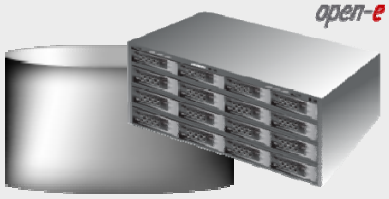


NOTE:

The Mirror server IP Address must be on the same subnet in order for the replication to communicate. VPN connections can work providing you are not using a NAT. Please follow example:

- Source: 192.168.1.220
- Destination: 192.168.1.221

Synchronous Volume Replication with Failover over a LAN



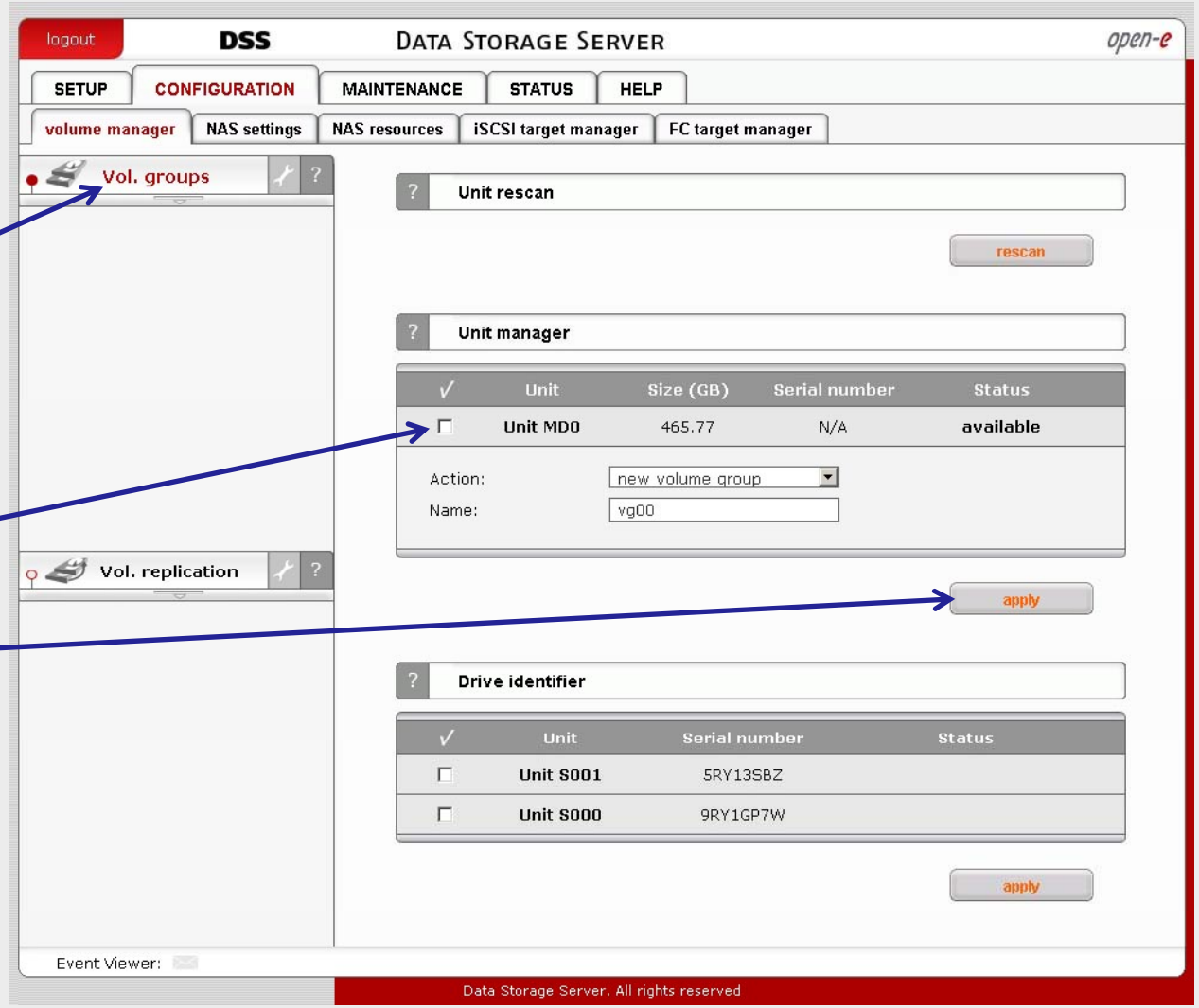
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

Under the „CONFIGURATION" tab, select „volume manager" and next Vol. Groups

Add the selected physical units (Unit MD0 or other) to create a new volume group (in this case, vg00) and click apply button

Volume Groups (vg00)



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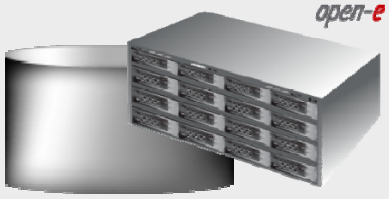


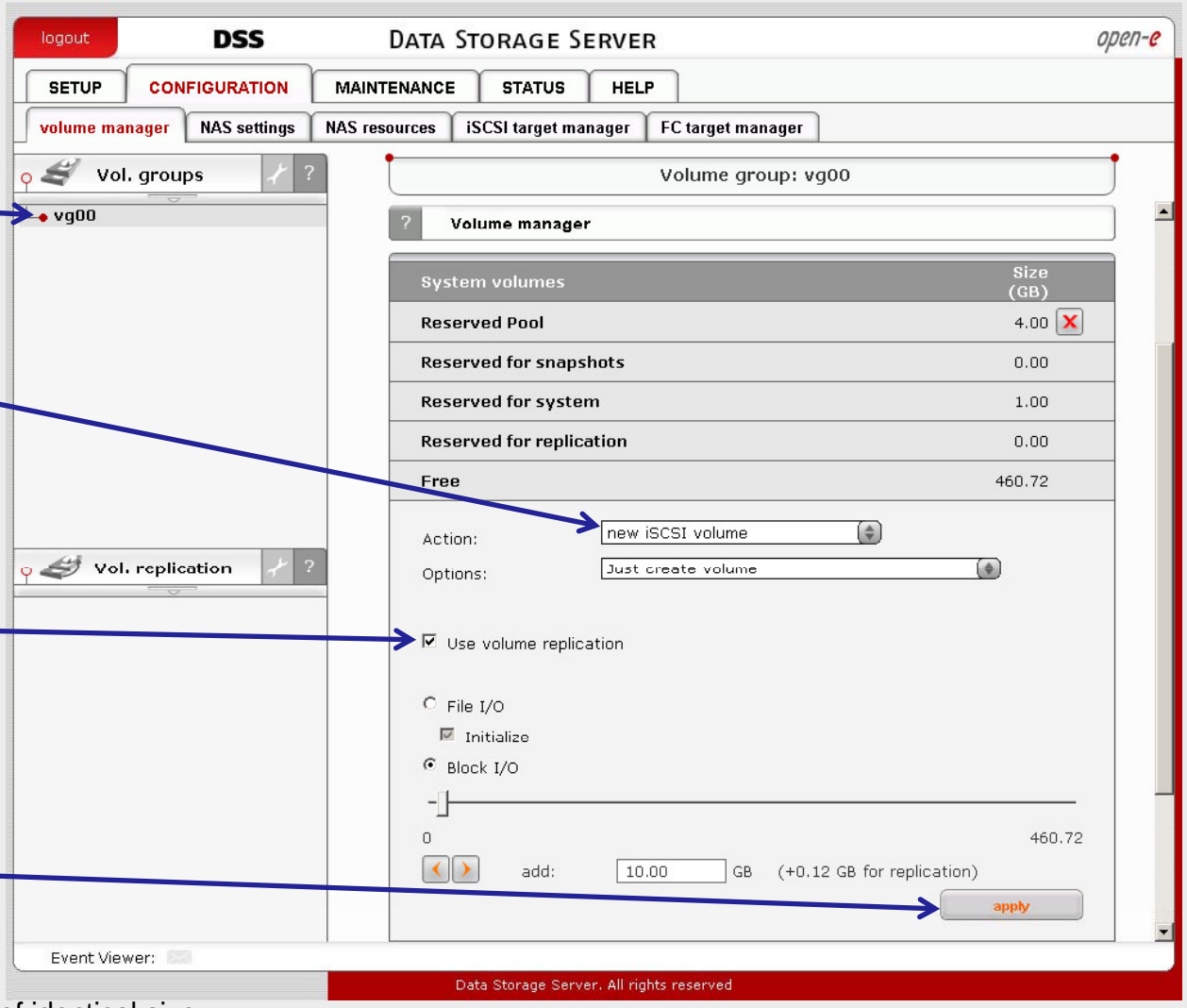
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

Select the appropriate volume group (vg00) from the list on the left and create a new iSCSI volume of the required size. This logical volume will be the destination of the replication process

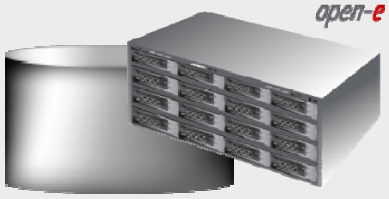
Next , check box Use volume replication

After assigning an appropriate amount of space for the iSCSI volume, click the apply button



NOTE:
The source and destination volumes must be of identical size.

Synchronous Volume Replication with Failover over a LAN

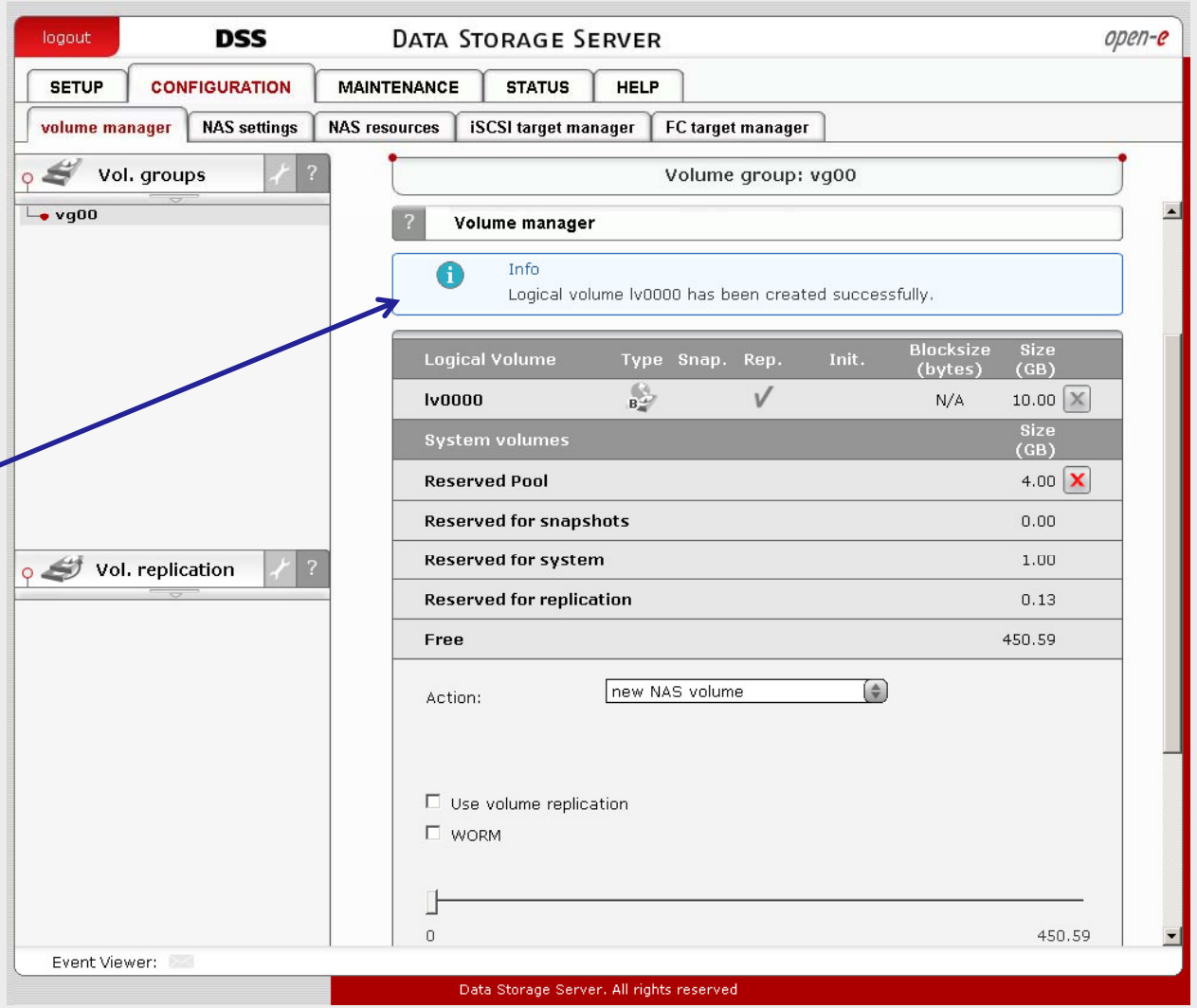


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

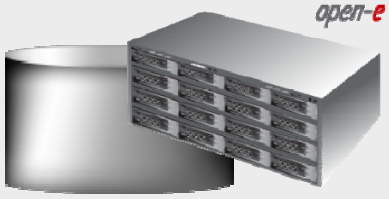
3. Configure the Primary node

The destination iSCSI Volume Block I/O is now configured.

iSCSI volume (lv0000)



Synchronous Volume Replication with Failover over a LAN

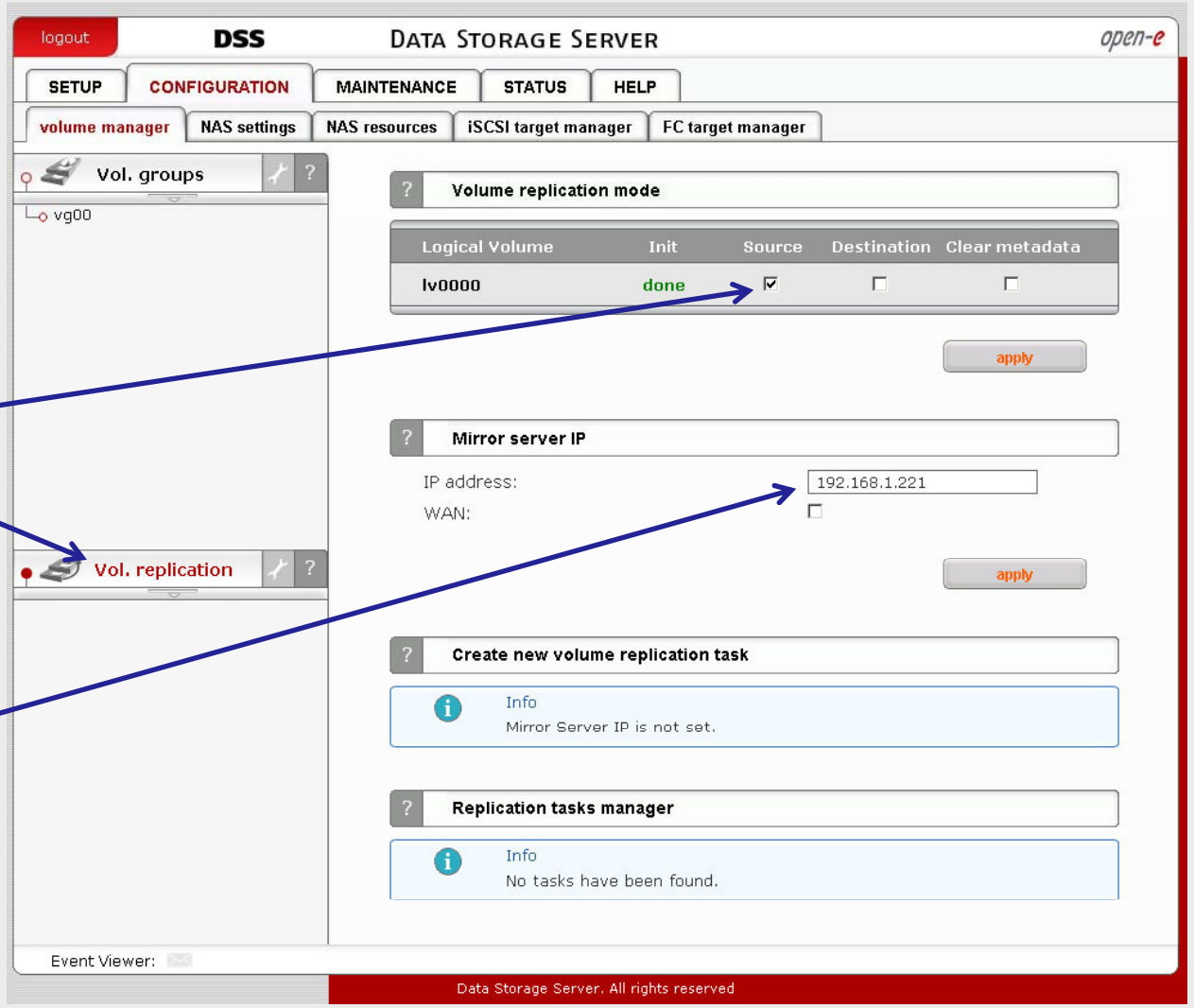


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

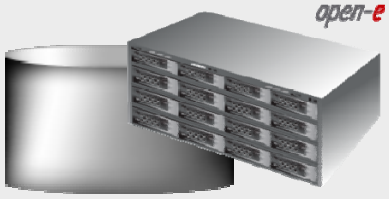
3. Configure the Primary node

Now, select Vol. replication, and check the box under Source and click the apply button

Next , under Mirror Server IP function, enter the IP address of the Secondary node (in our example this would be 192.168.1.221) and click the apply button



Synchronous Volume Replication with Failover over a LAN

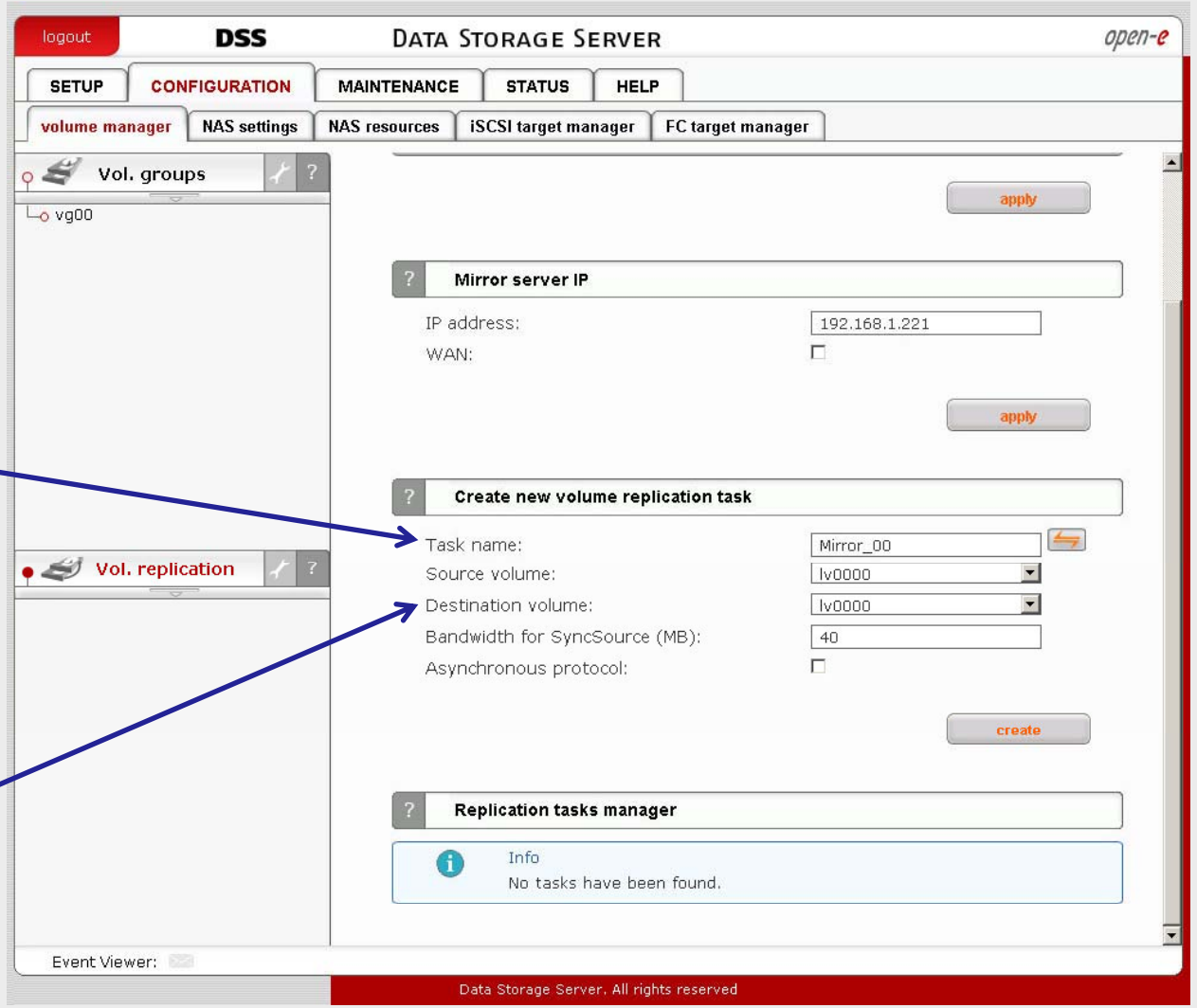


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

Enter the task name in field Task name next click on the button

In the Destination volume field select the appropriate volume (in this example, lv0000) and click create to confirm.



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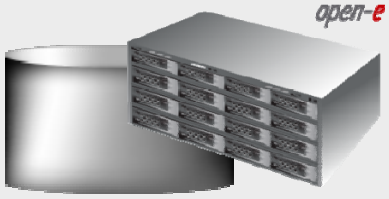
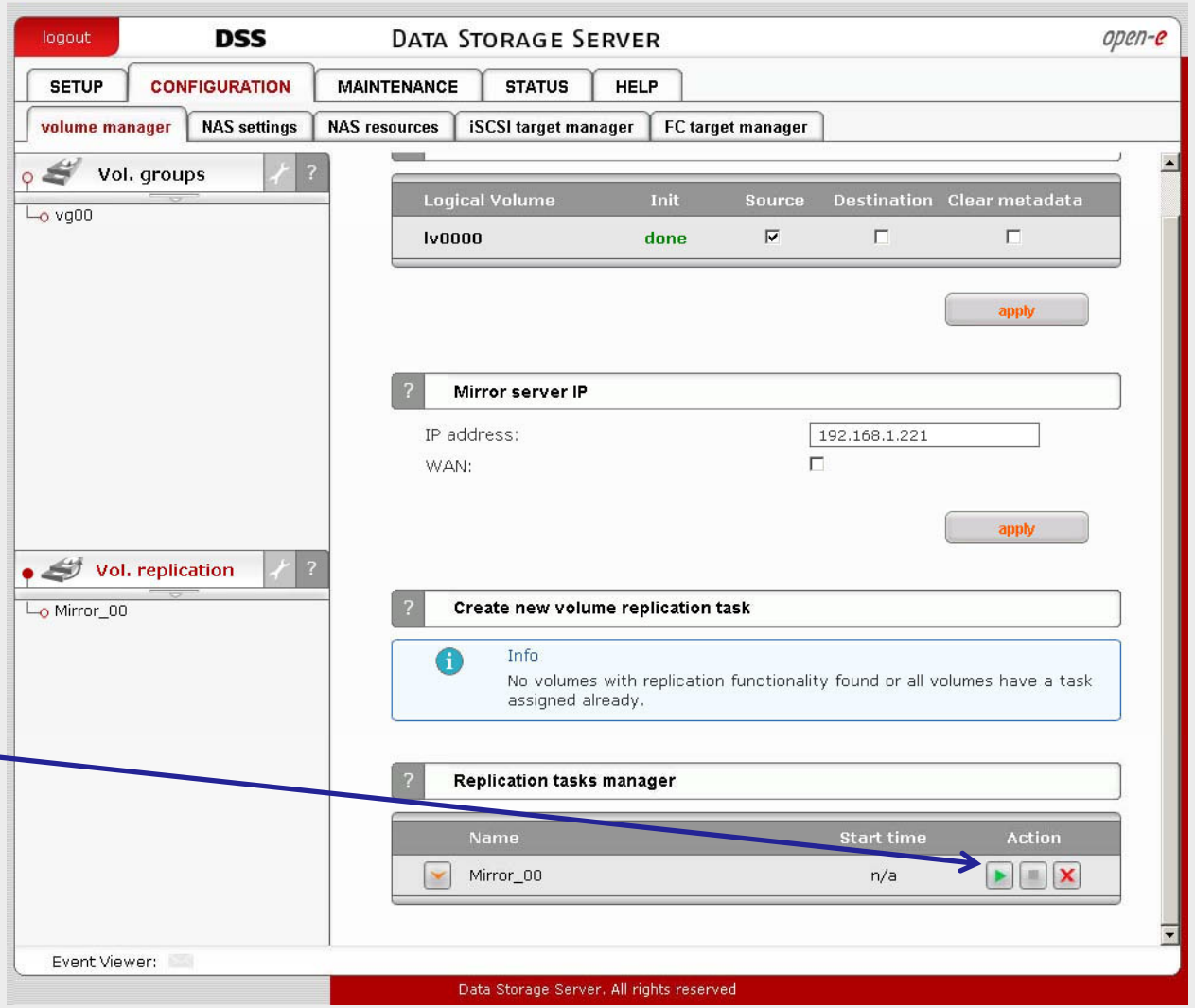


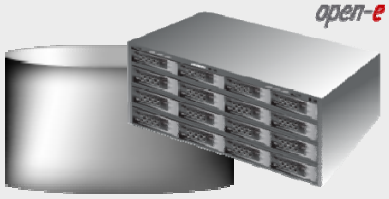
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

Now, in the Replication task manager function, click on ▶ button under to start the Replication task on the Primary node



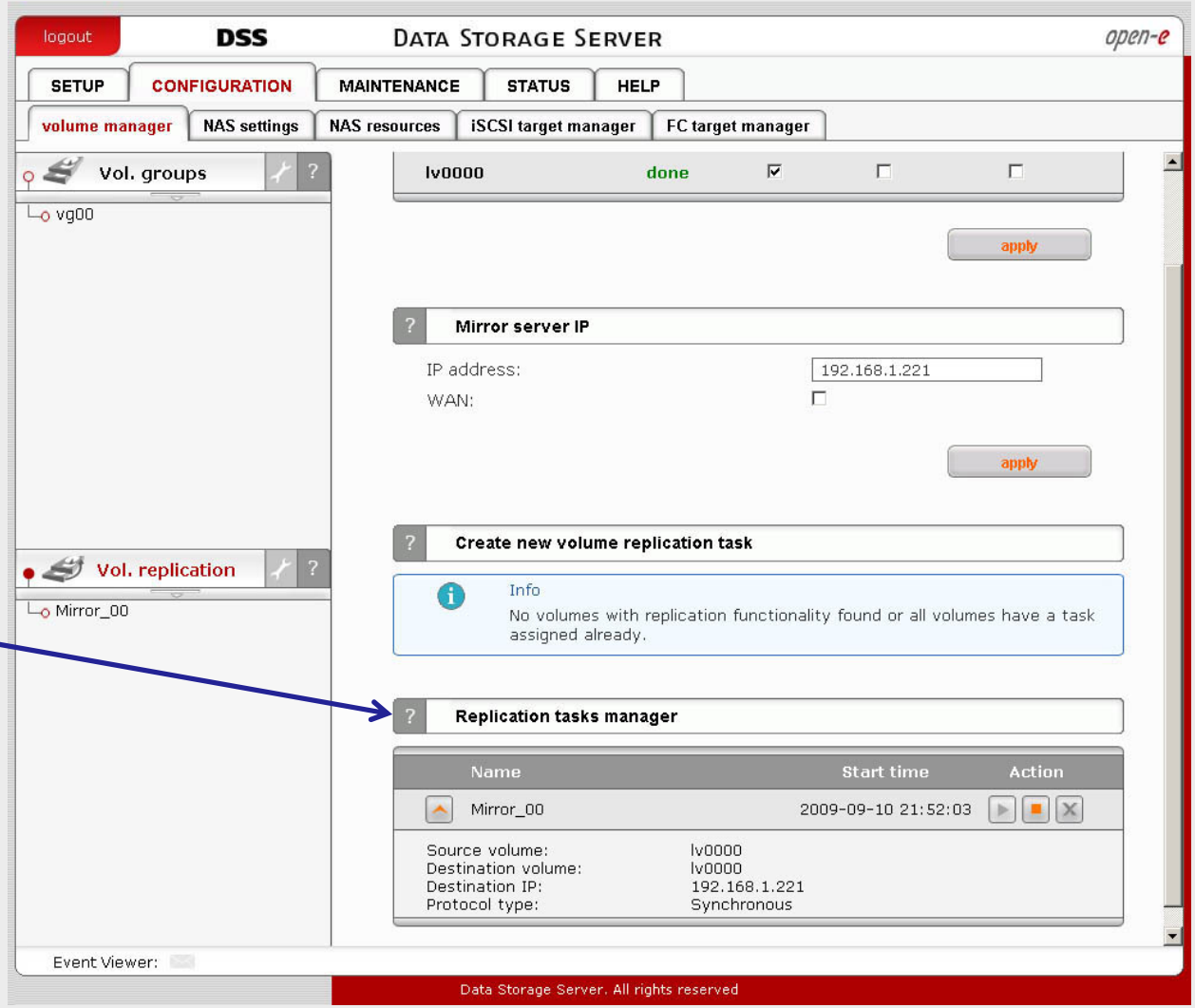
Synchronous Volume Replication with Failover over a LAN



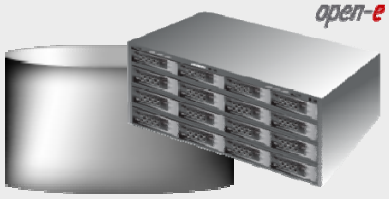
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

In the Replication tasks manager function information is available about the current running replication task.



Synchronous Volume Replication with Failover over a LAN

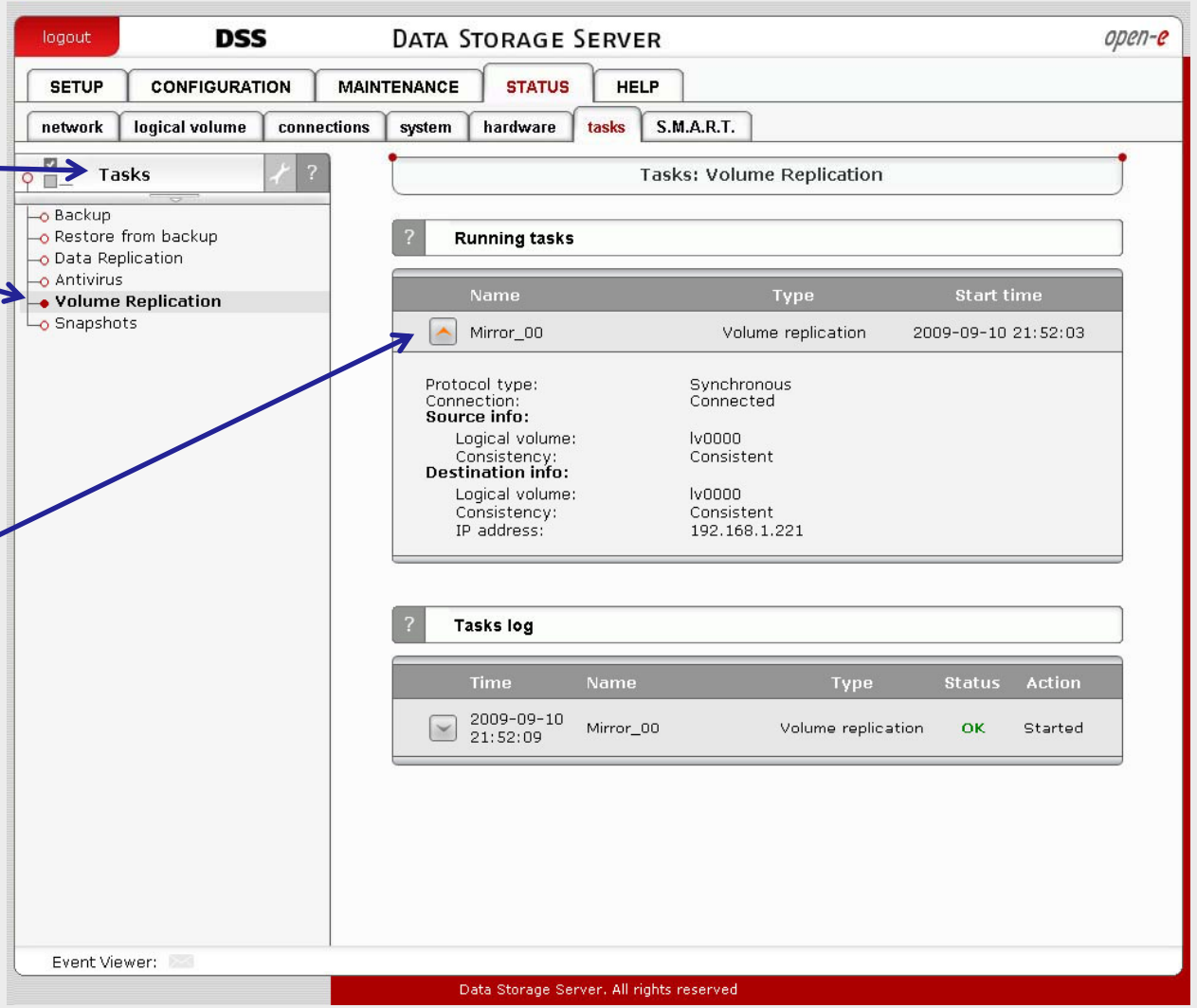


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

3. Configure the Primary node

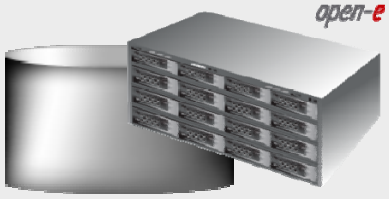
Under the „STATUS" tab, select „Tasks" and Volume Replication

Click on the button with task name (in this case Mirror_00) to display detailed information on the current replication task



NOTE:
Please allow the replication task to complete similar to above with status being "Consistent" before writing to the iSCSI Logical Volume.

Synchronous Volume Replication with Failover over a LAN

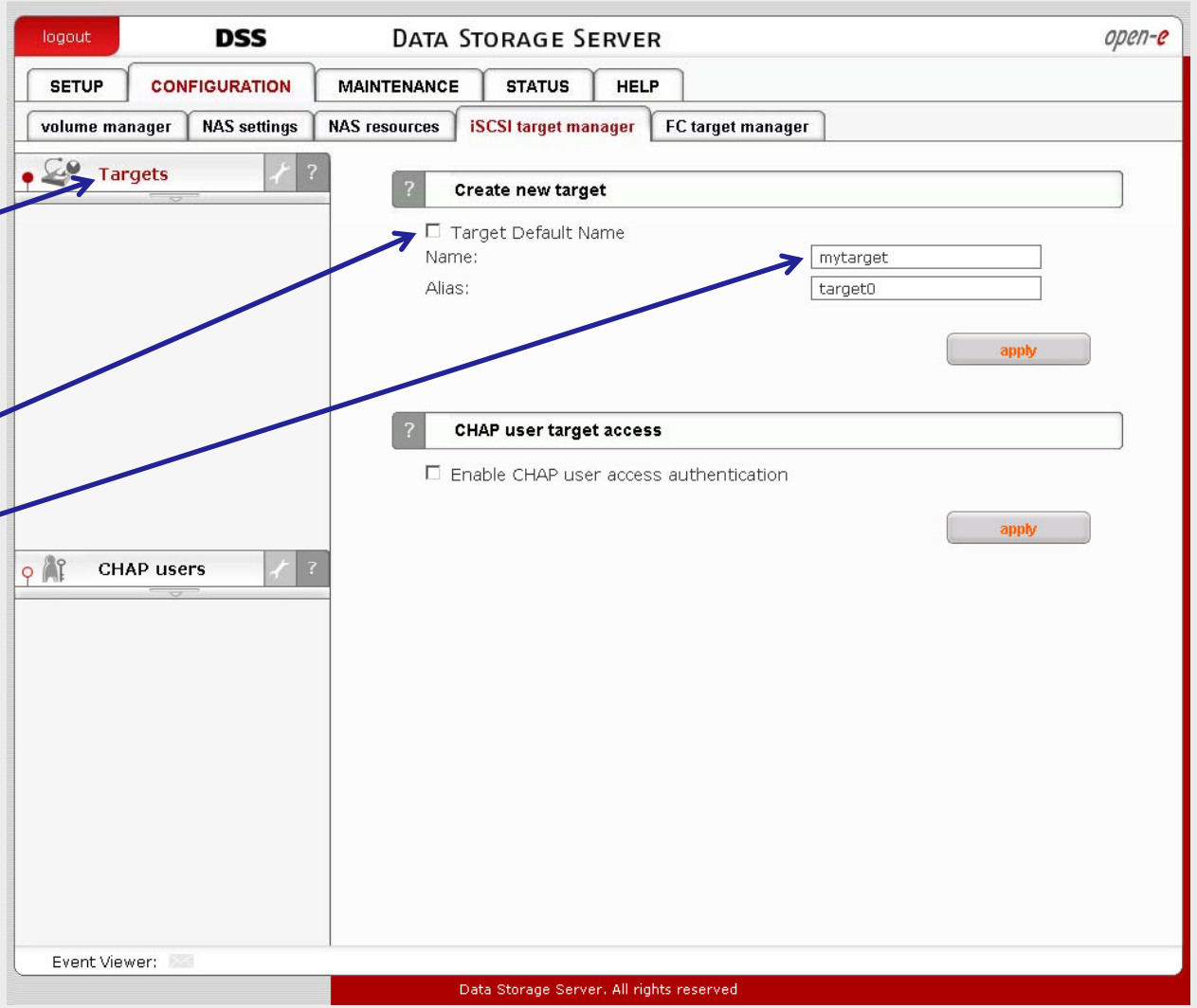


Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

4. Create new target on the Secondary node

Choose „CONFIGURATION", „iSCSI target manager" and „Targets" from the menu

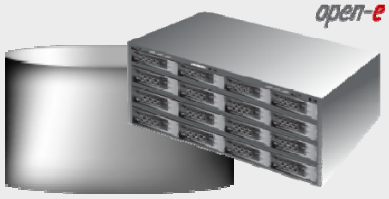
In the Create new target function, uncheck the box Target Default Name, and enter a name for the new target in the Name field and click apply to confirm



iSCSI targets

NOTE:
Both systems must have the same Target name.

Synchronous Volume Replication with Failover over a LAN



Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

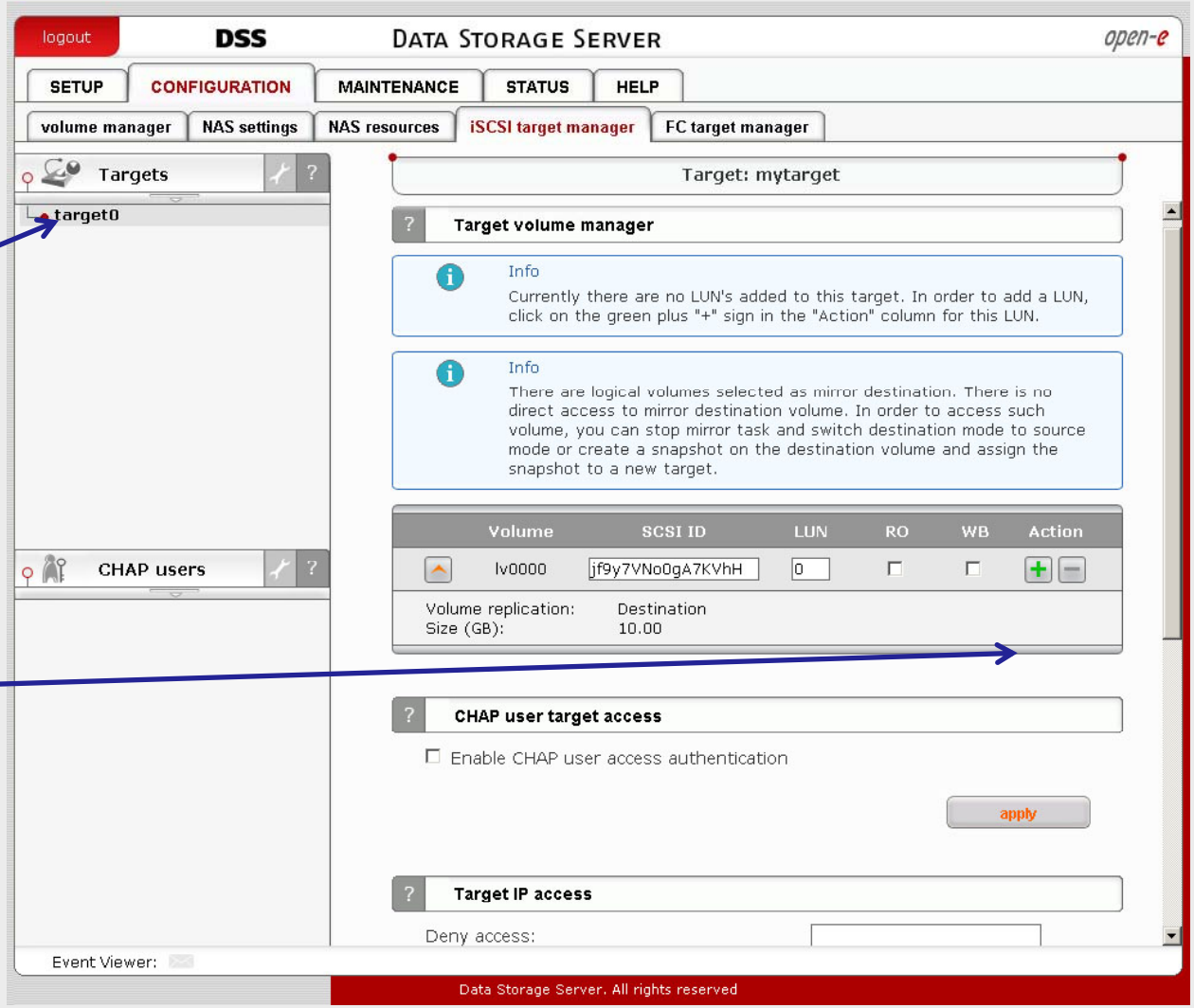
4. Create new target on the Secondary node

Select target0 within the Targets field.

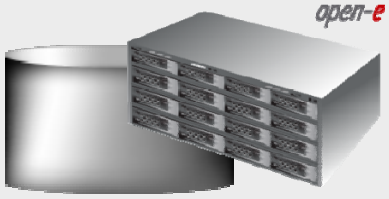
To assign a volume to the target, click the button + located under Action.

NOTE:
Both systems must have the same SCSI ID and LUN#

WARNING:
Please do not switch on the write back (WB) cache !



Synchronous Volume Replication with Failover over a LAN

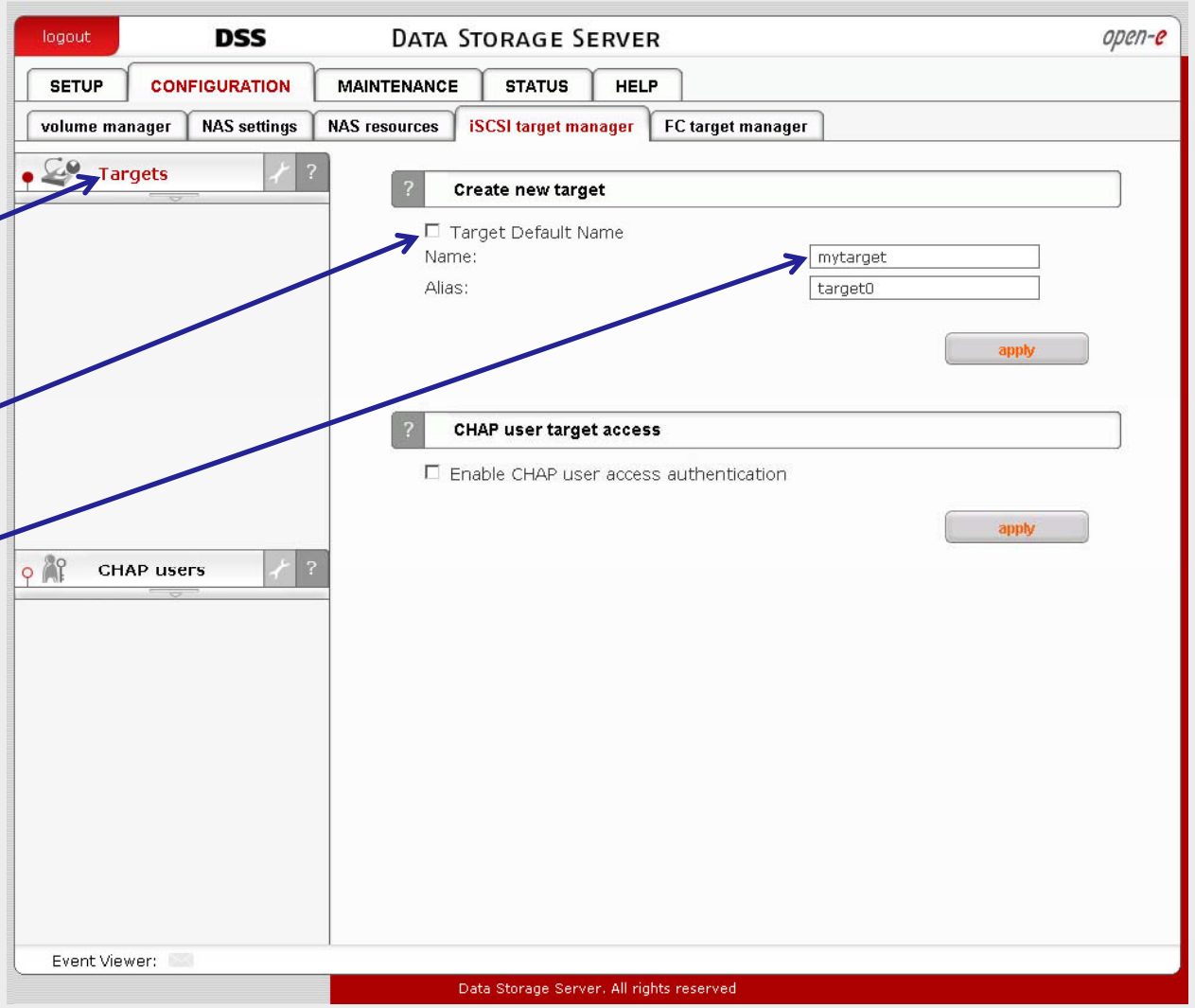


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

5. Create new target on the Primary node

Choose „CONFIGURATION” and „iSCSI target manager” and „Targets” from the menu

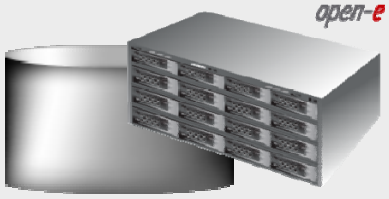
In the Create new target function, uncheck the box Target Default Name, and enter a name for the new target in the Name field and click apply to confirm



iSCSI targets

NOTE:
Both systems must have the same Target name.

Synchronous Volume Replication with Failover over a LAN

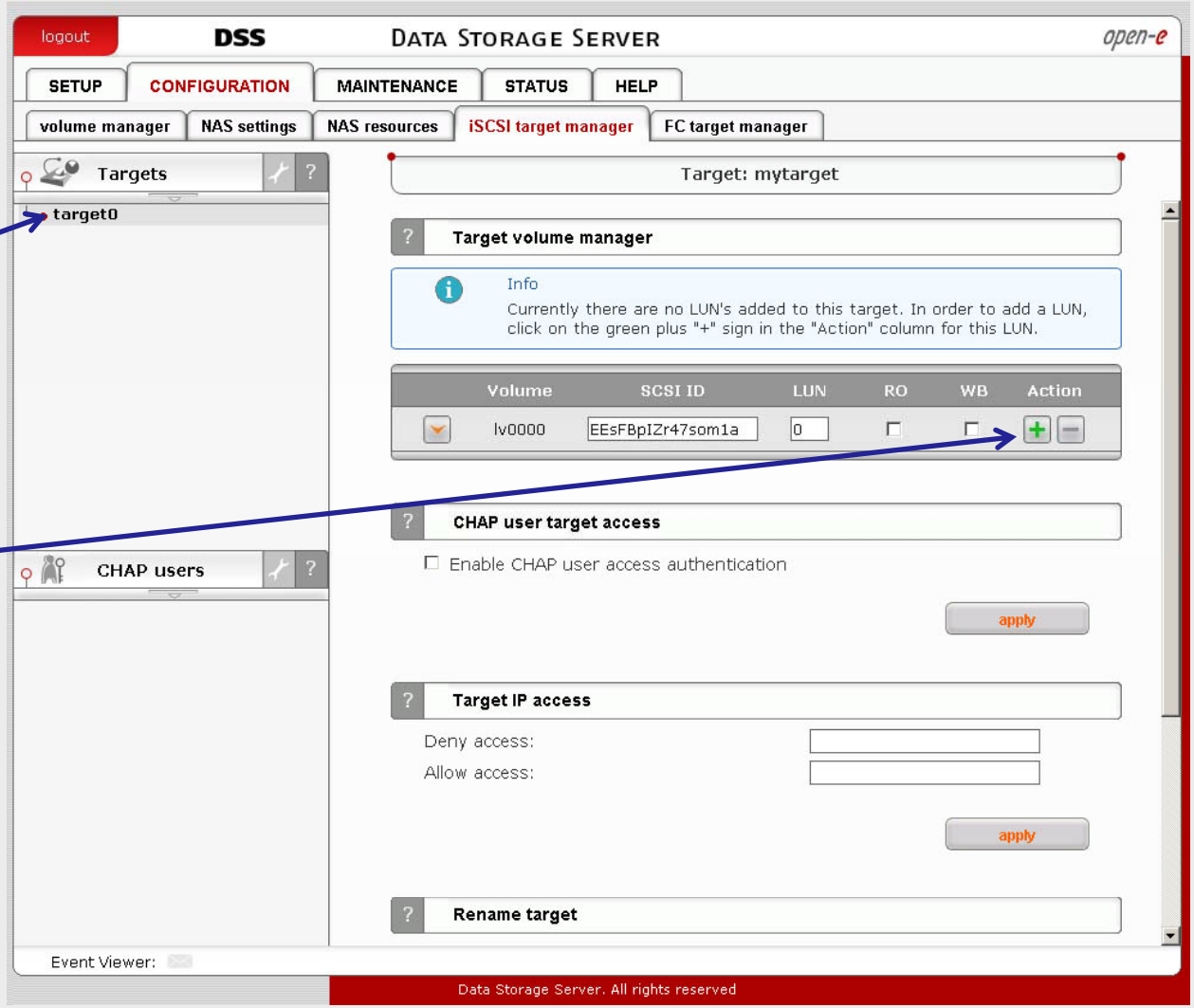


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

5. Create new target on the Primary node

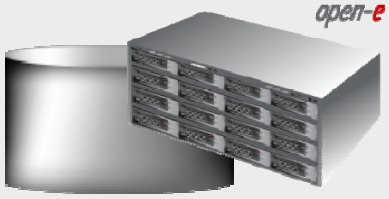
Select the target0 within the Targets field

To assign a volume to the target, click the button + located under Action.



WARNING:
Please do not switch on the write back cache (WB) !

Synchronous Volume Replication with Failover over a LAN

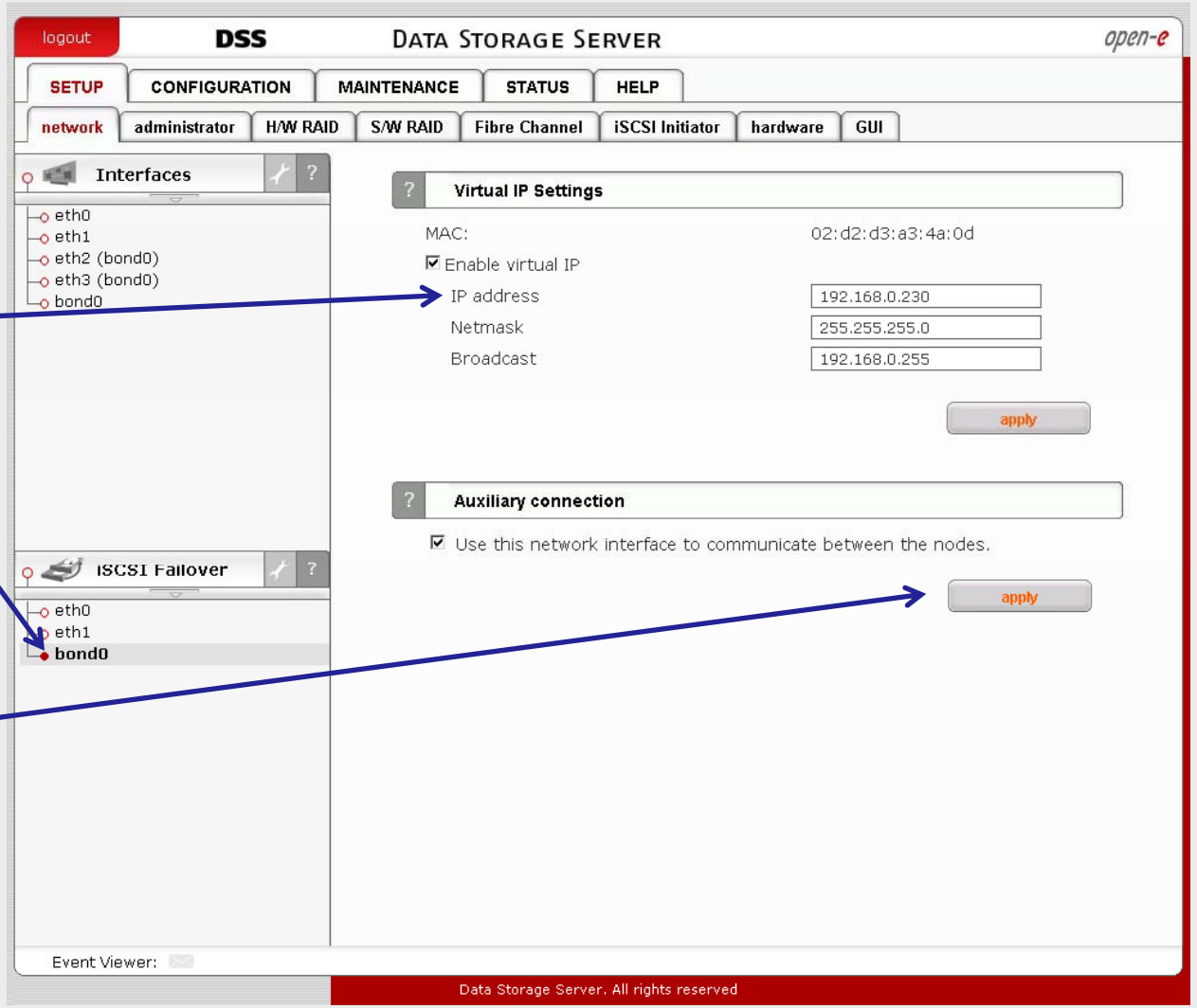


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

6. Configure Virtual IP and Auxillary connection

Now, select the bond0 within iSCSI Failover.
In the Virtual IP Settings function check box Enable virtual IP and enter IP address, Netmask, Broadcast, and click the apply button.

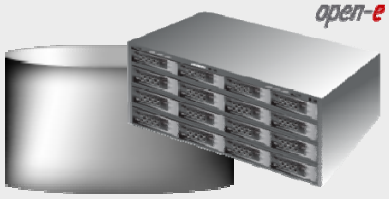
In the Auxiliary connection function check box Use this network interface to communicate between the nodes and click the apply button.



NOTE:

There need to be at least two *auxiliary connections*. The interface with the virtual IP can also serve as one of the auxiliary connections. Please set the Virtual IP Address in a different network subnet then the physical IP Address. To have additional iSCSI Failover systems, please set this pair in a different network subnet from the other iSCSI Failover systems. This limitation will be removed in the future.

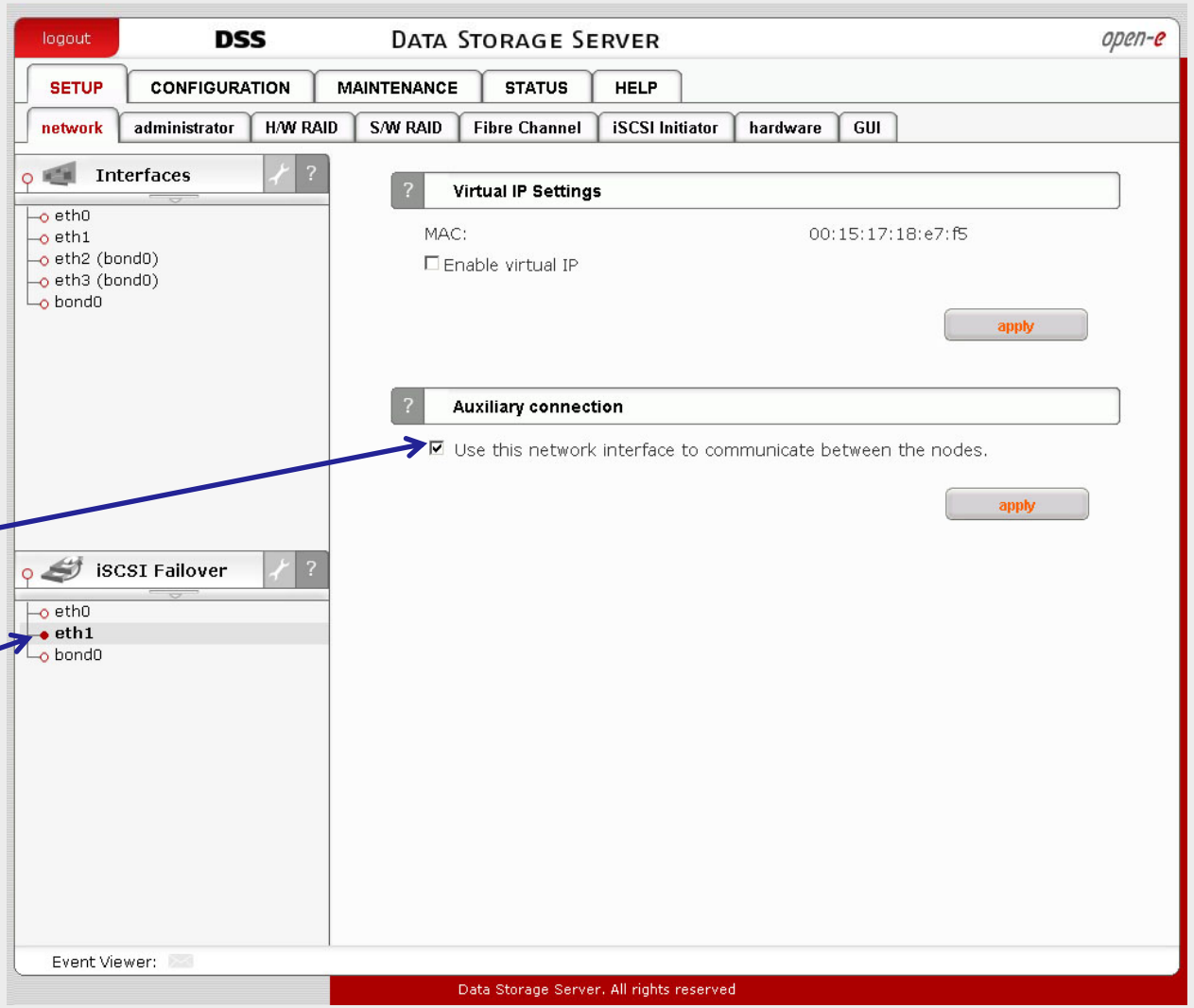
Synchronous Volume Replication with Failover over a LAN



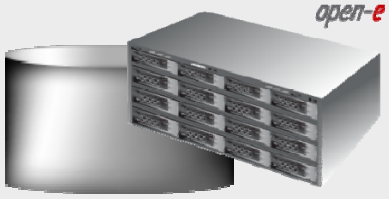
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

6. Configure Virtual IP and Auxillary connection

Now, select the eth1 within iSCSI Failover.
In the Auxiliary connection function check box Use this network interface to communicate between the nodes and click the apply button.



Synchronous Volume Replication with Failover over a LAN



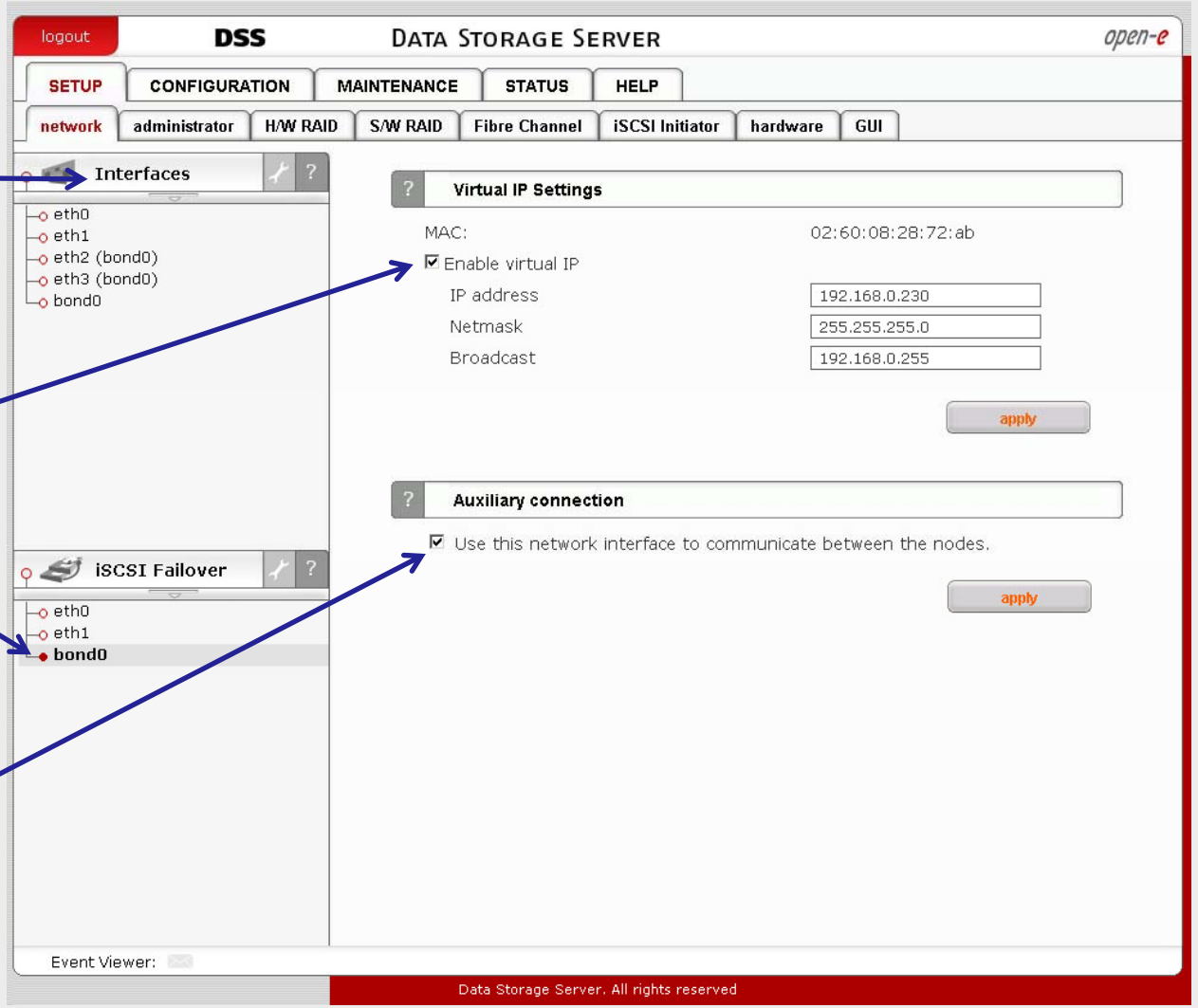
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

6. Configure Virtual IP and Auxillary connection

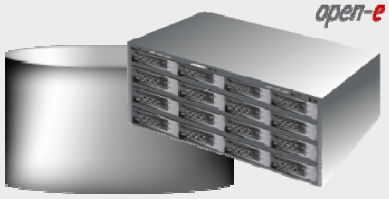
Choose, „SETUP" and „network" and „Interface" from the menu

Now, select the bond0 within iSCSI Failover.
In the Virtual IP Settings function check the box Enable virtual IP and enter IP address, Netmask, Broadcast, and click the apply button.

In the Auxiliary connection function check box Use this network interface to communicate between the nodes and click the apply button.



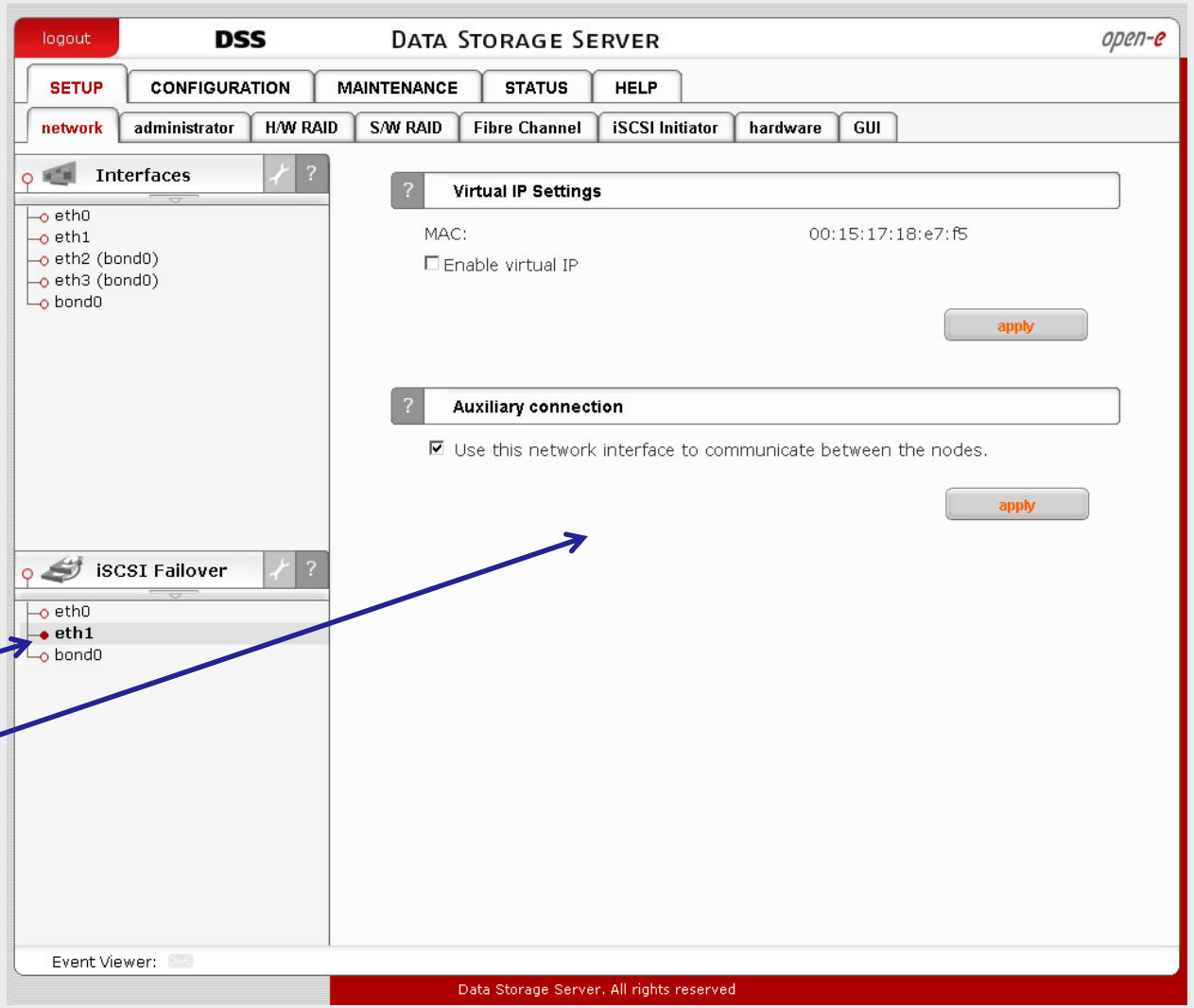
Synchronous Volume Replication with Failover over a LAN



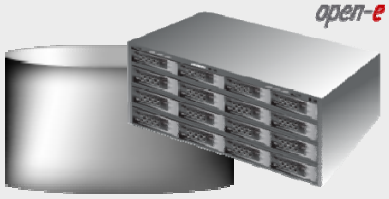
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

6. Configure Virtual IP and Auxillary connection

Now, select the eth1 within iSCSI Failover.
In the Auxiliary connection function check box Use this network interface to communicate between the nodes and click the apply button.



Synchronous Volume Replication with Failover over a LAN

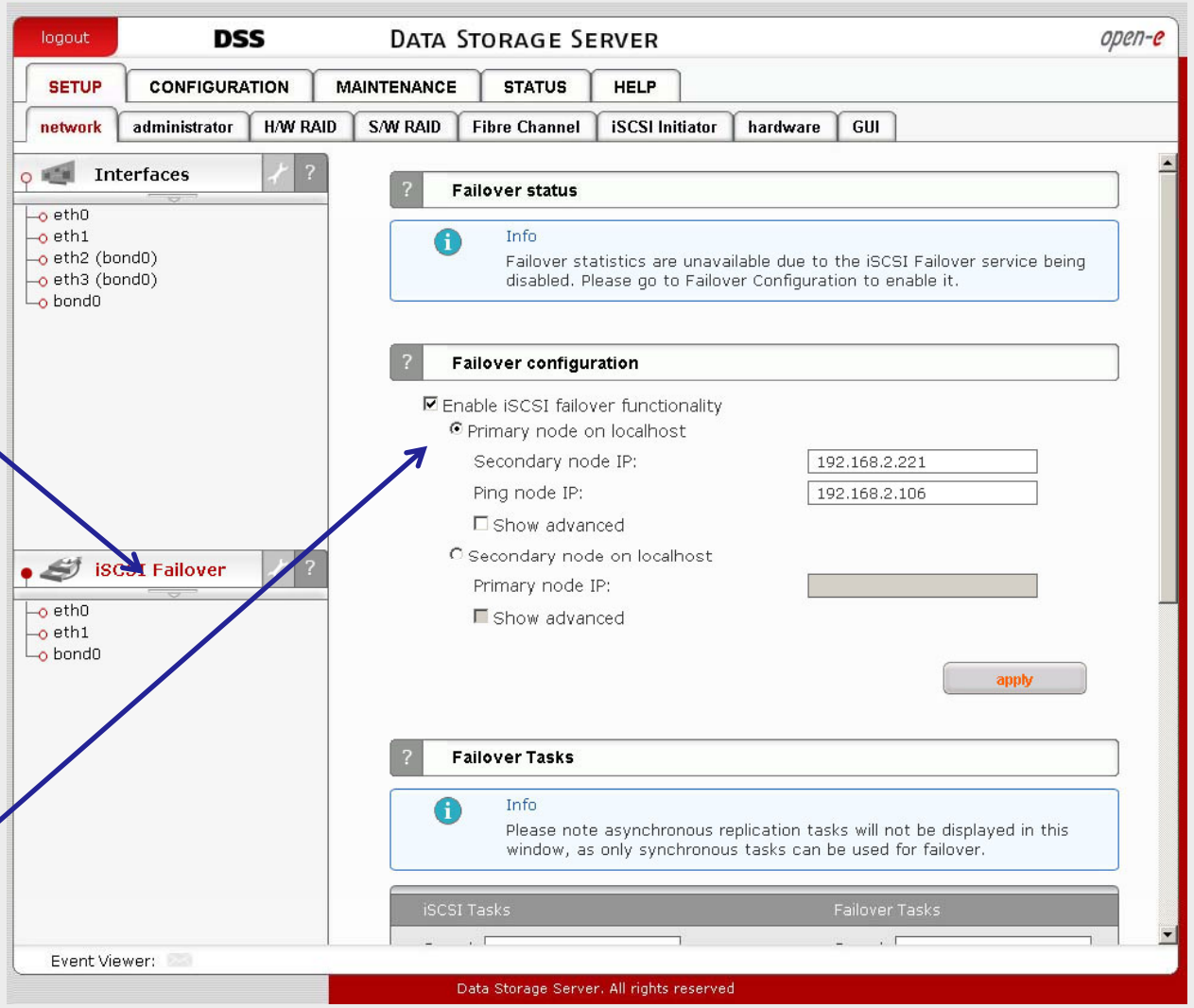


Data Server (DSS1)
Primary node
Address IP:192.168.0.220

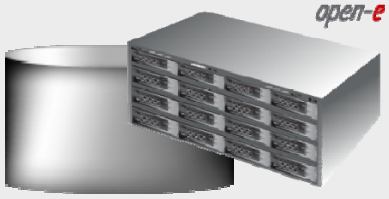
7. Configure iSCSI Failover

Now, select iSCSI Failover

In the Failover configuration function, check the box Enable iSCSI failover functionality and enter the Secondary node IP address and the Ping Node IP and click the apply button



Synchronous Volume Replication with Failover over a LAN

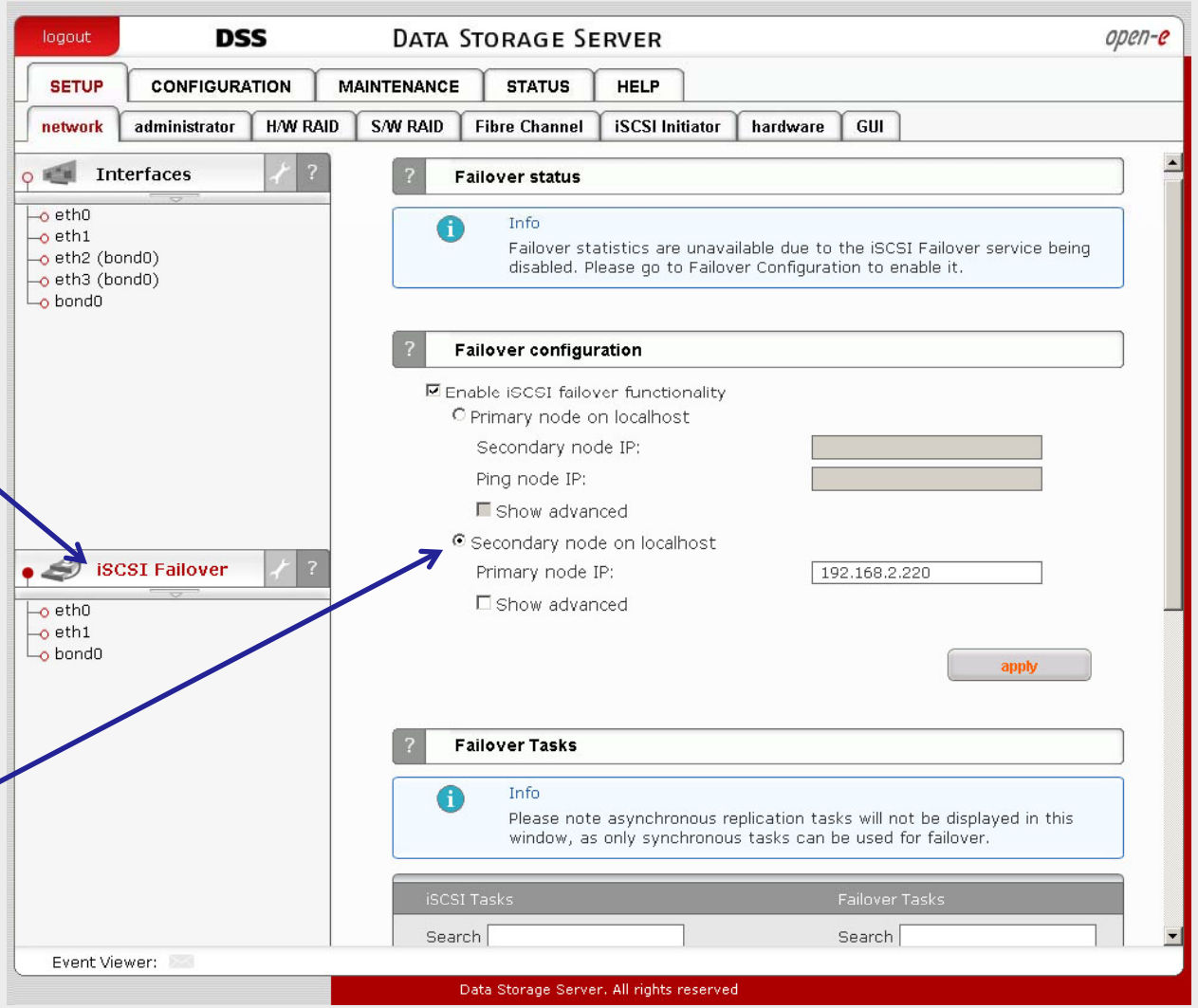


Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

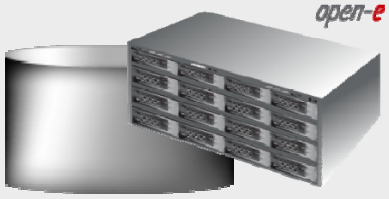
7. Configure iSCSI Failover

Now, select iSCSI Failover

Now, in Failover configuration function , check the box Enable iSCSI failover functionality and enter Primary node IP address and click the apply button



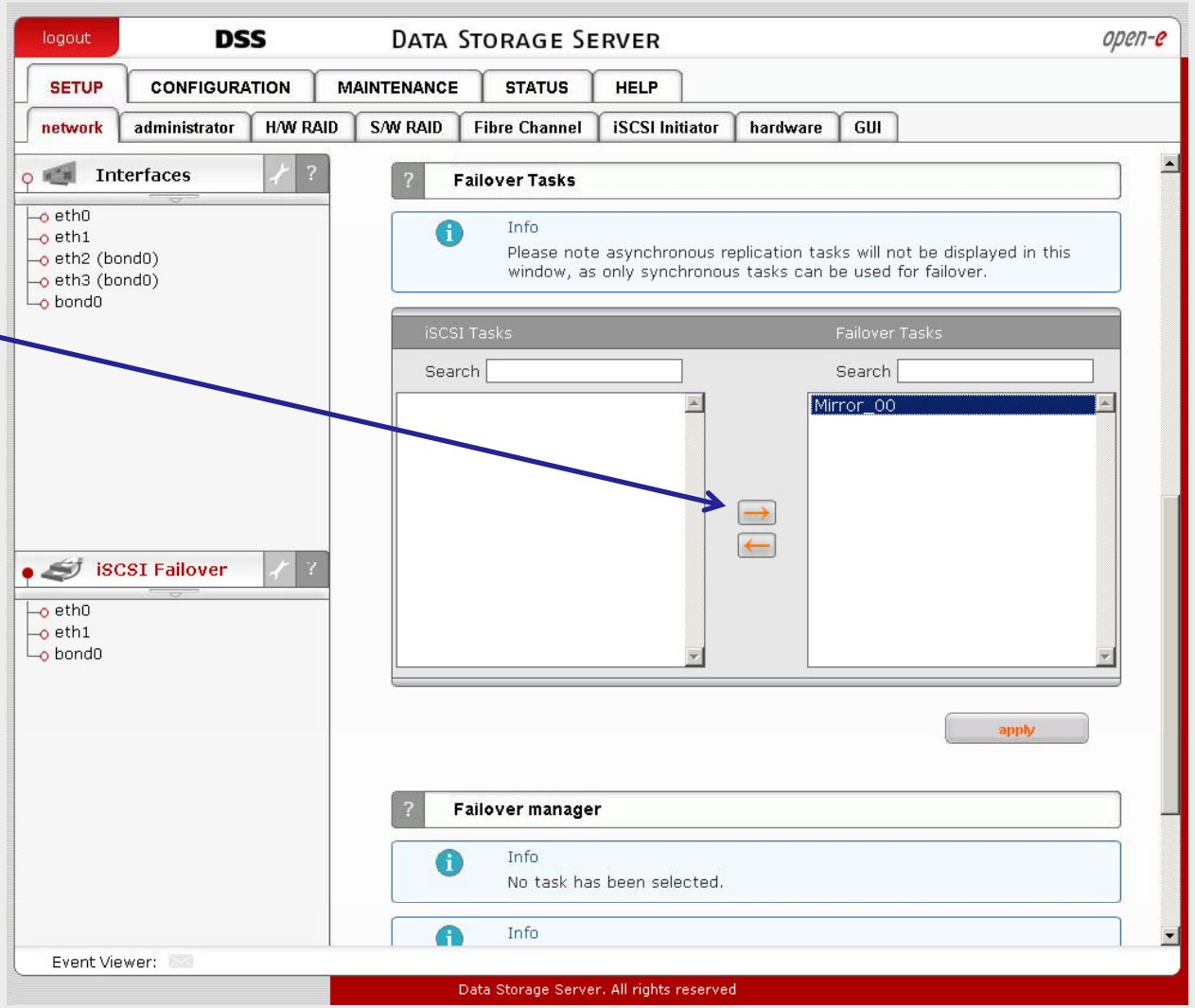
Synchronous Volume Replication with Failover over a LAN



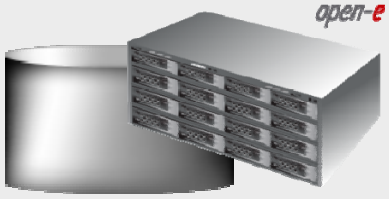
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

7. Configure iSCSI Failover

Move the iSCSI Tasks to be used for the failover service to the Failover Tasks area by clicking → button and click apply

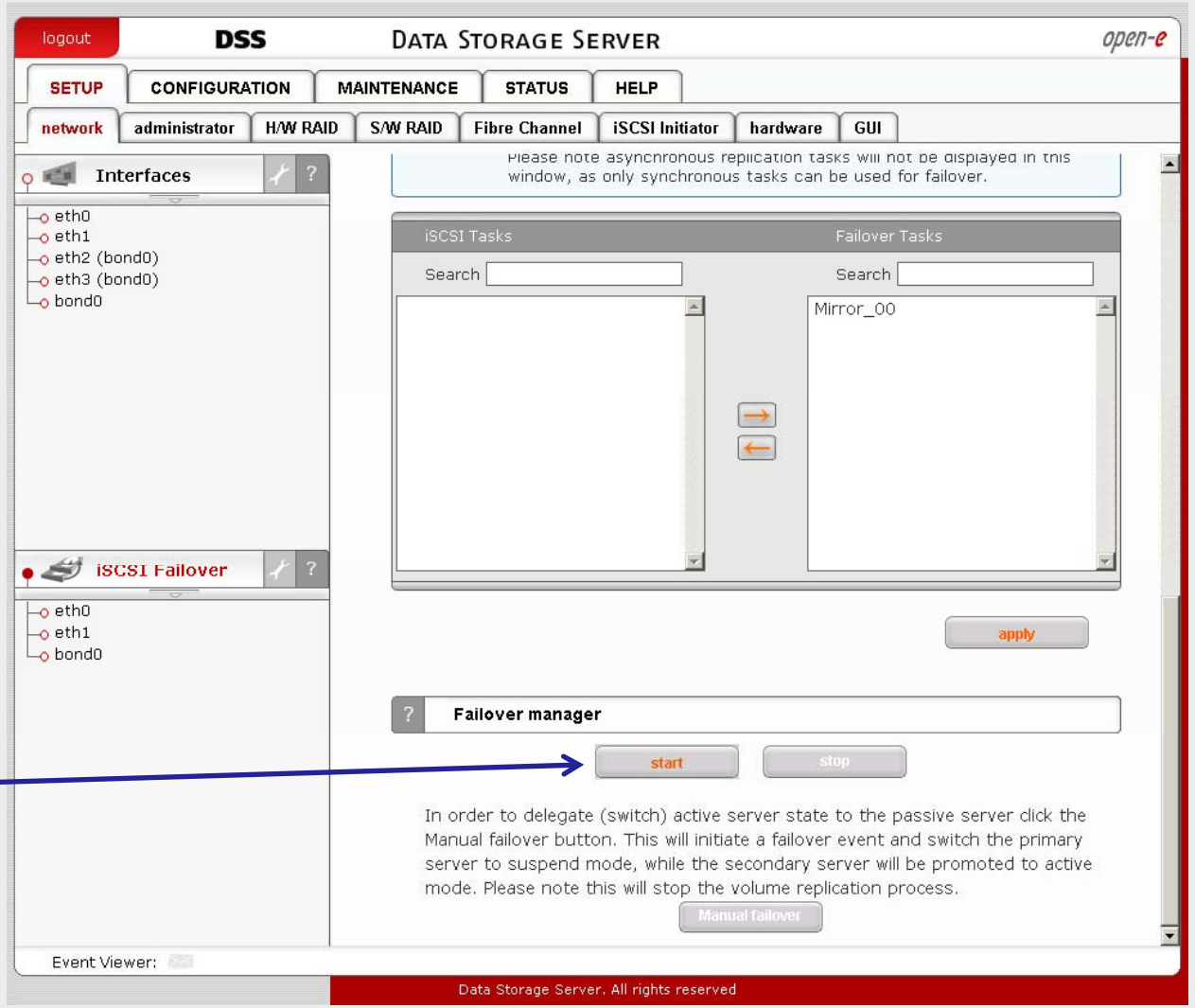


Synchronous Volume Replication with Failover over a LAN



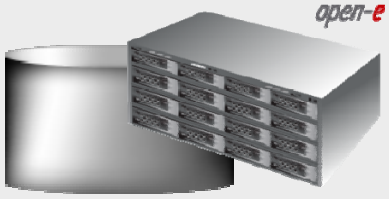
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

8. Start Failover Service



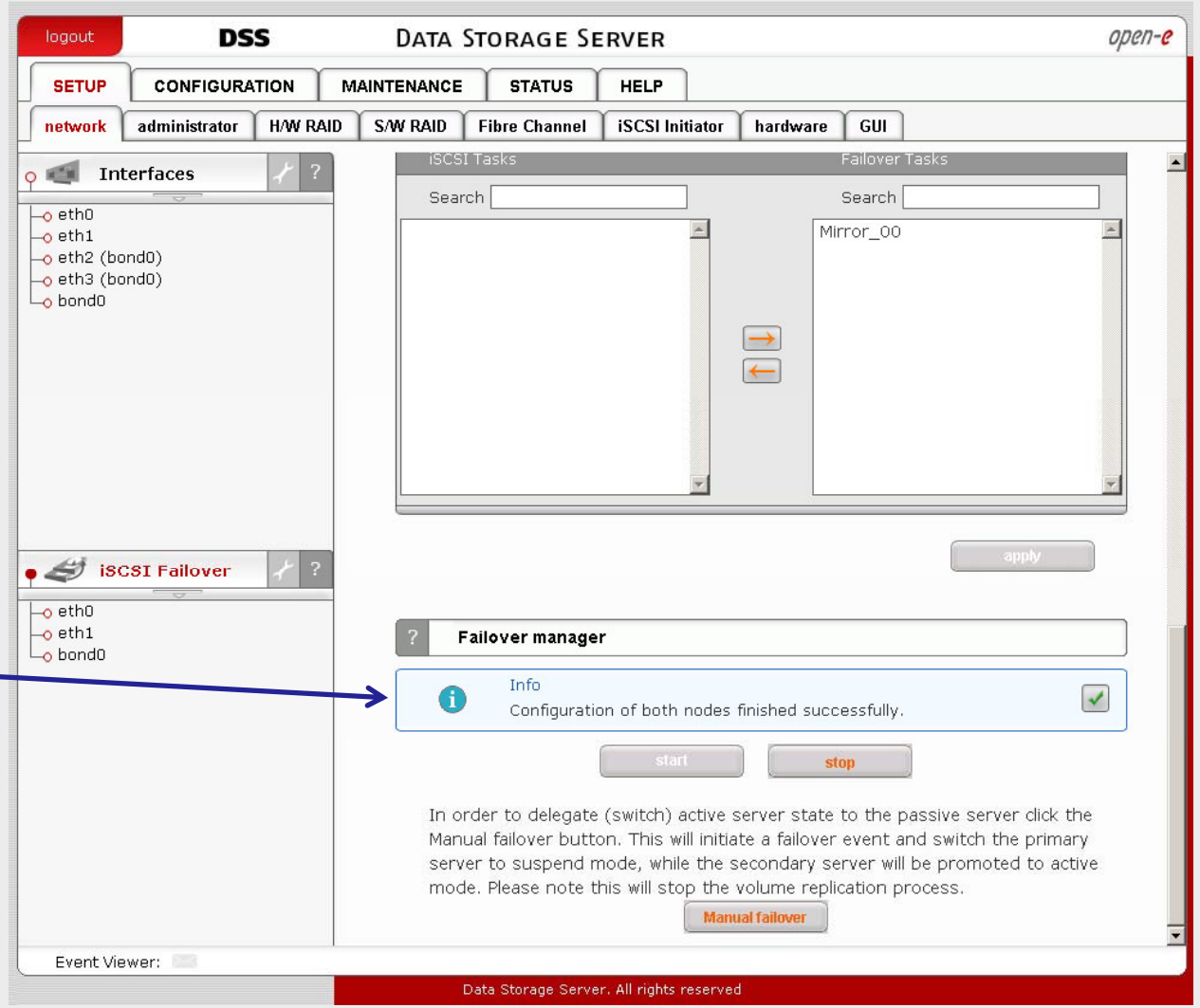
At this point both nodes are ready to start the Failover service

Synchronous Volume Replication with Failover over a LAN



Data Server (DSS1)
Primary node
Address IP:192.168.0.220

8. Start Failover Service

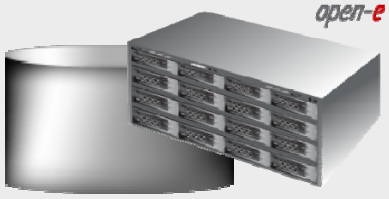


After clicking the start button configuration of both nodes will be complete

NOTE:

You can now connect via your iSCSI initiator and use your targets via the Virtual IP address e.g. 192.168.10.230 (For example, in a Microsoft Windows environment, download Microsoft iSCSI Initiator ver 2.0 or later).

Synchronous Volume Replication with Failover over a LAN

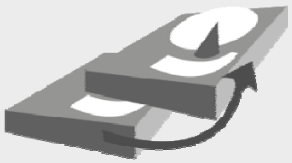


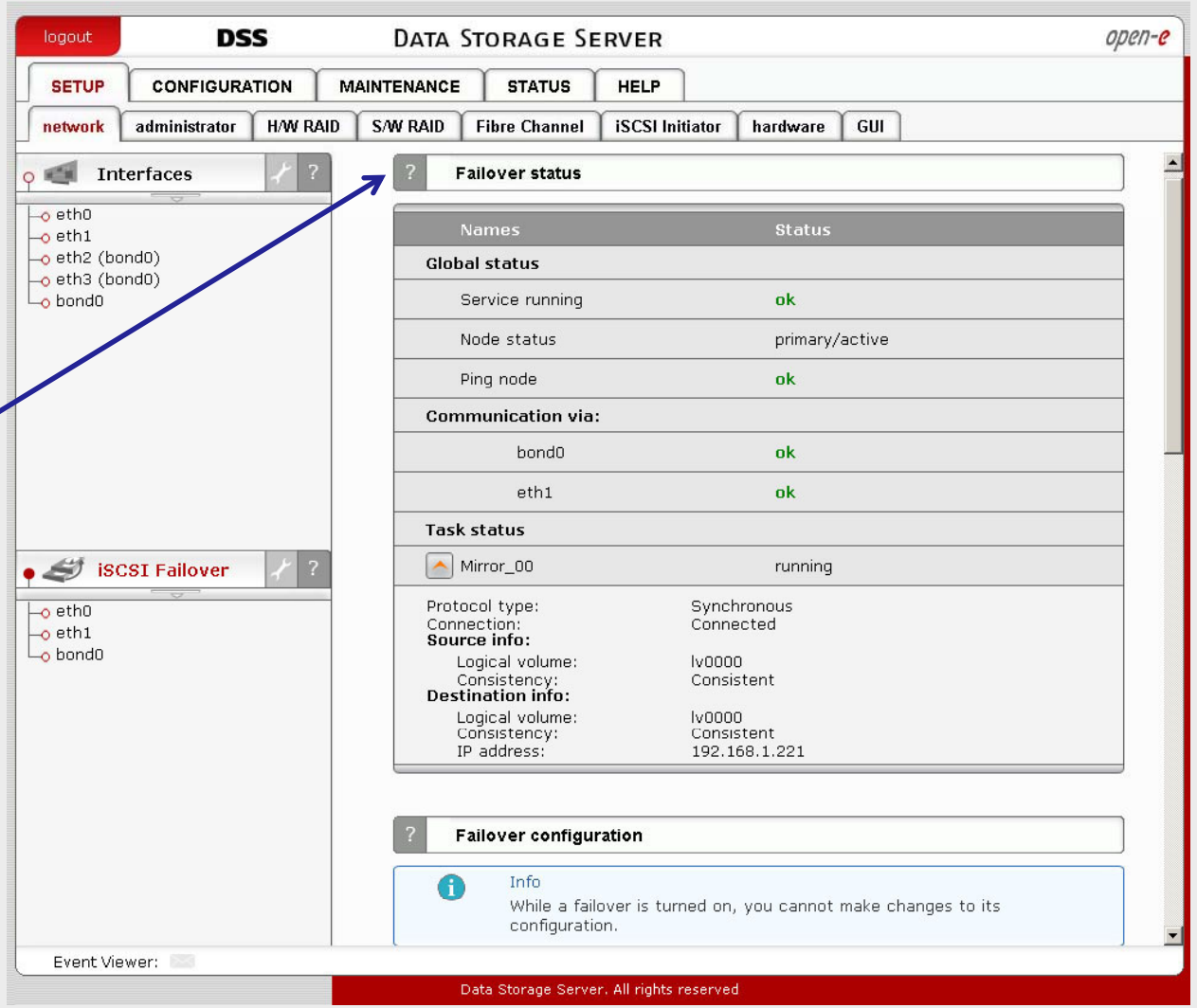
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

8. Start Failover Service

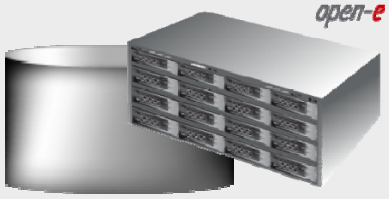
After start Failover, check the status in **Failover status** function. All must read OK. In the task status, the destination volume must be consistent

iSCSI Failover/Volume Replication





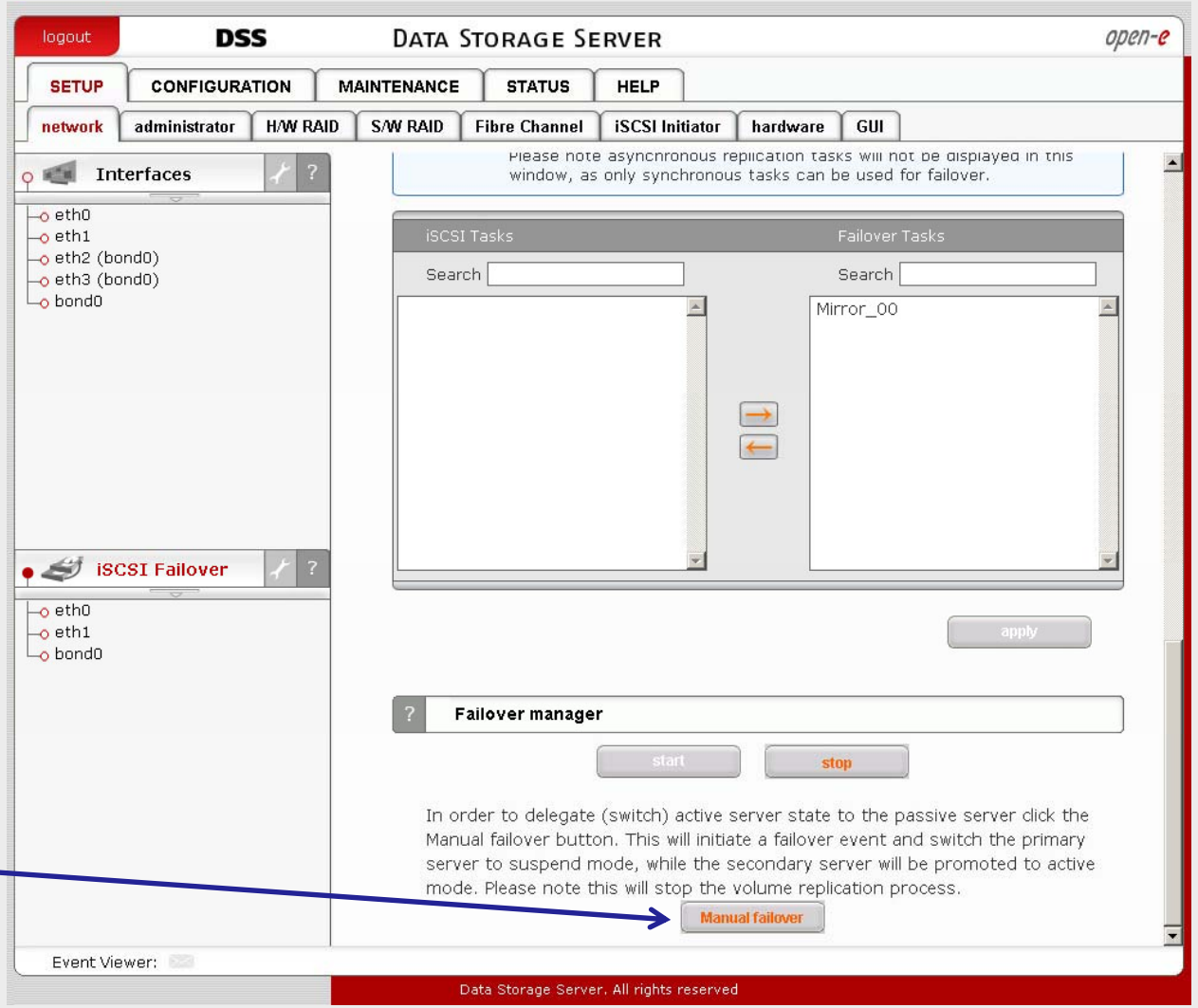
Synchronous Volume Replication with Failover over a LAN



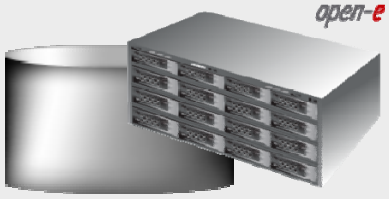
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

9. Test Failover Function

In order to test Failover in Manual Failover function, click on the Manual failover button

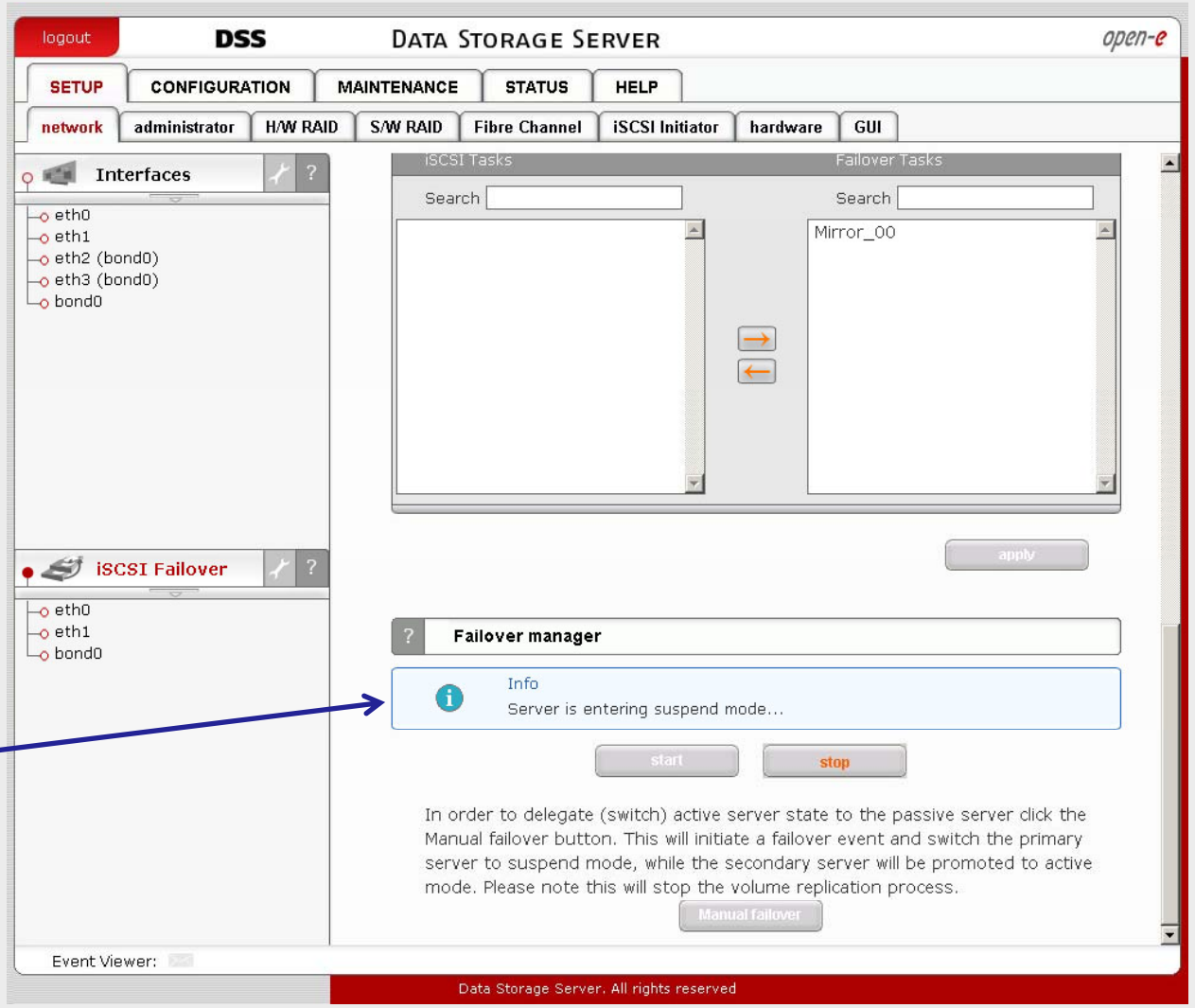


Synchronous Volume Replication with Failover over a LAN



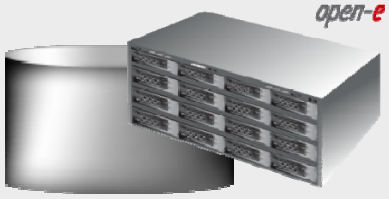
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

9. Test Failover Function



After clicking on the Manual failover button, primary node enters suspend mode

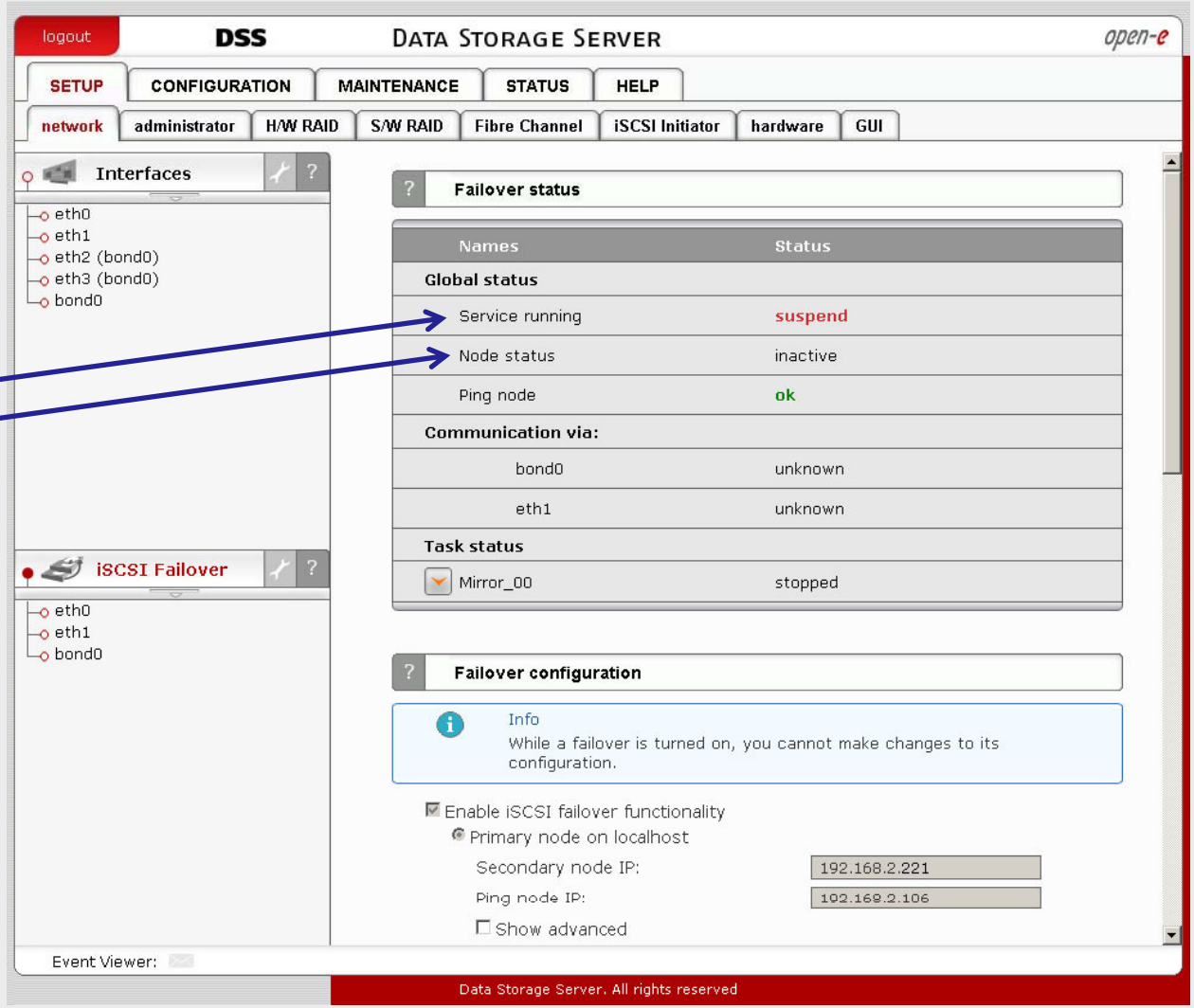
Synchronous Volume Replication with Failover over a LAN



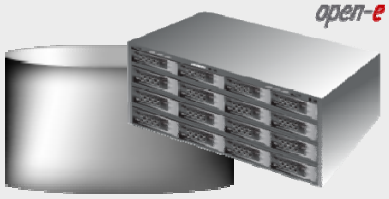
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

9. Test Failover Function

The Failover status function shows the Global status of the primary node. Status service is in suspend mode and the node is inactive.



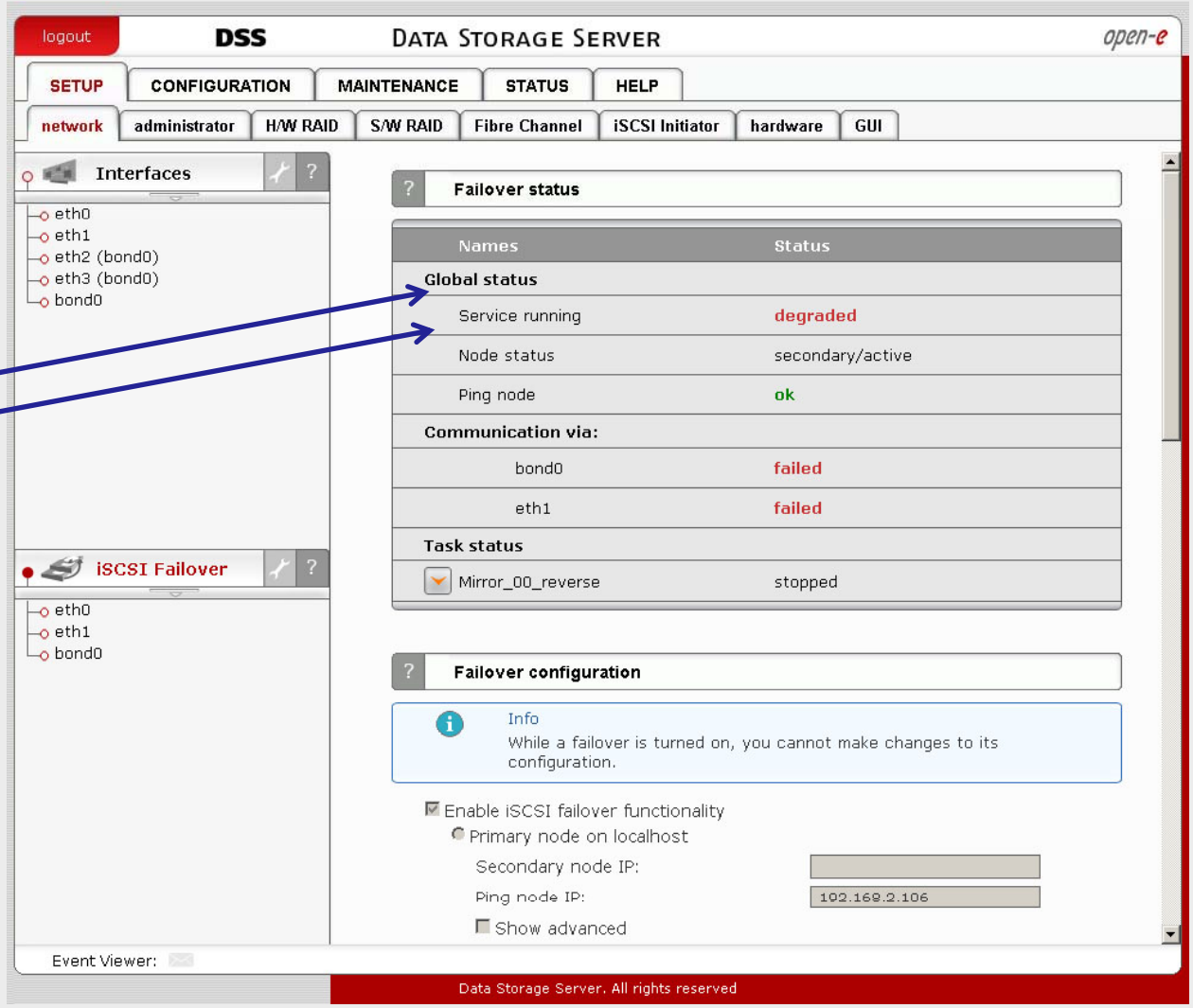
Synchronous Volume Replication with Failover over a LAN



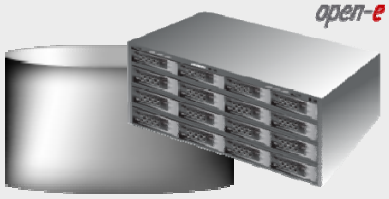
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

9. Test Failover Function

In Failover status function Global status shows the status of the secondary node. The service status is degraded and Node status is active.



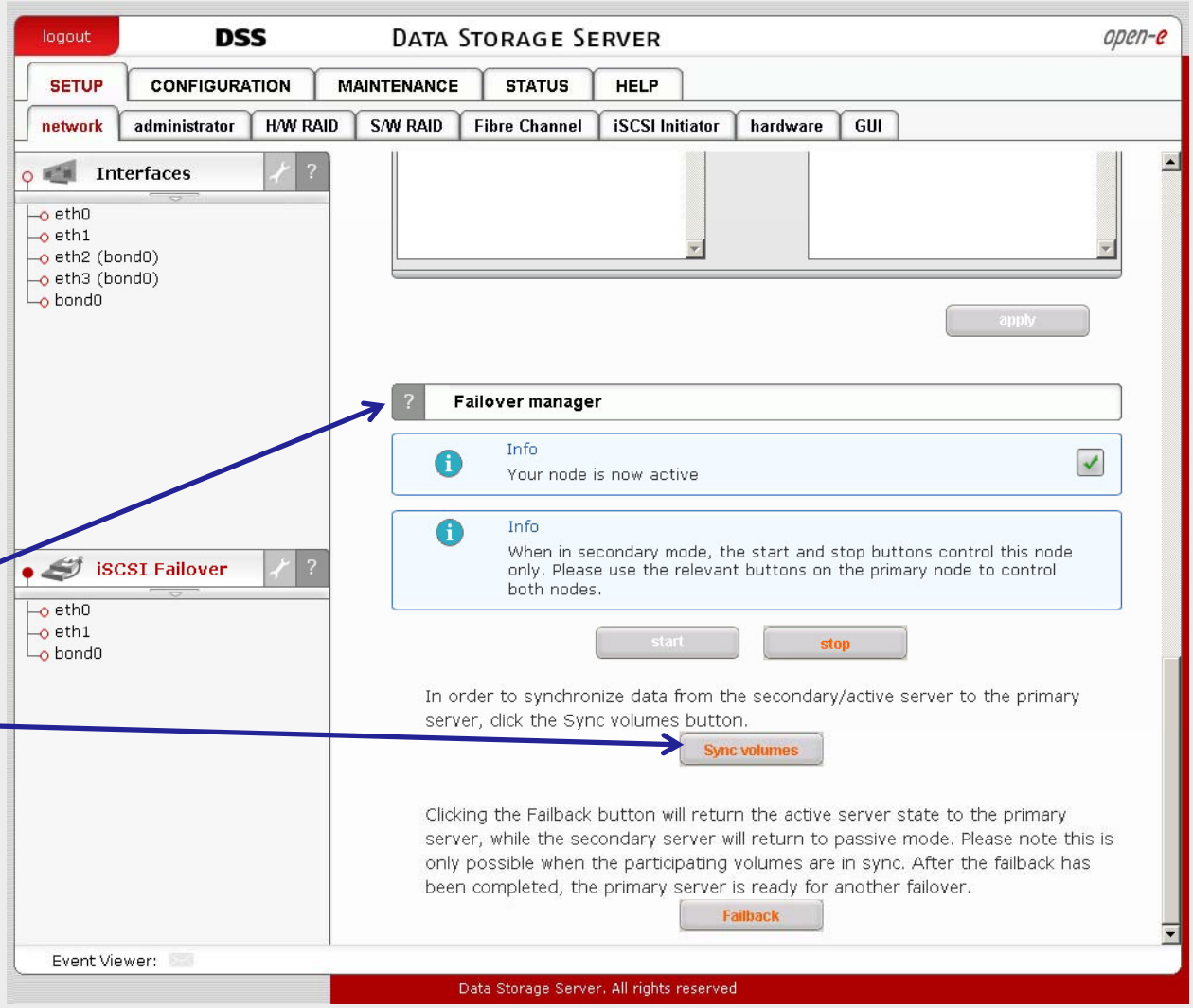
Synchronous Volume Replication with Failover over a LAN



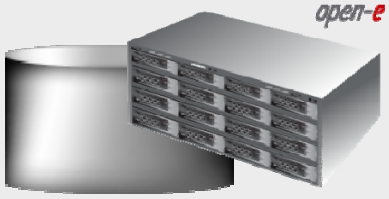
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

10. Run Failback Function

In order to run Failback in Failover manager function click on the Sync volumes button first.



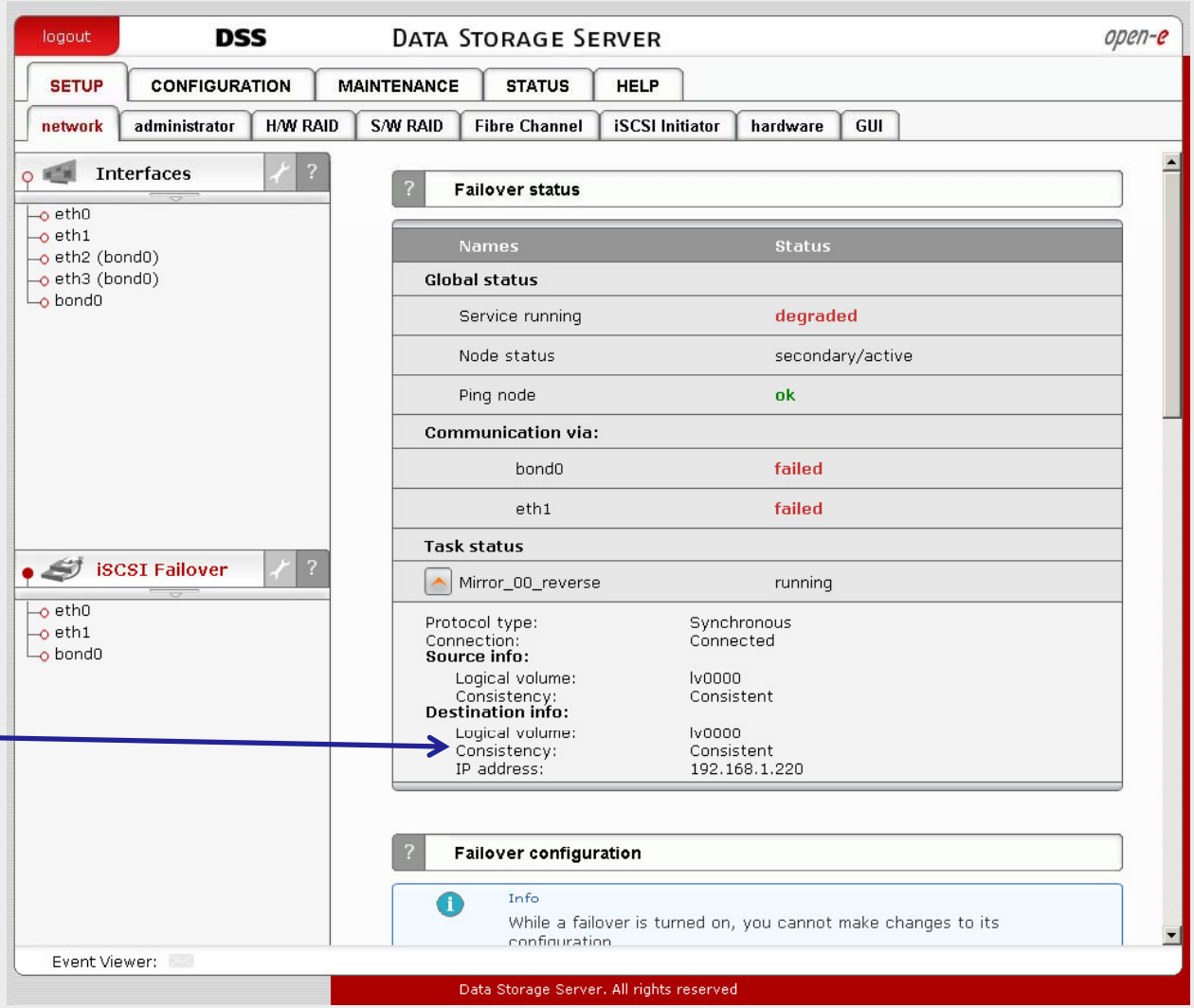
Synchronous Volume Replication with Failover over a LAN



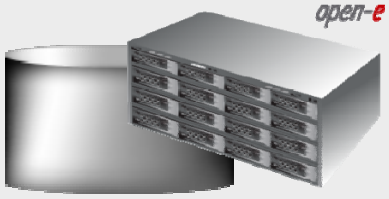
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

10. Run Failback Function

After synchronization the task status of the destination volume must be Consistent

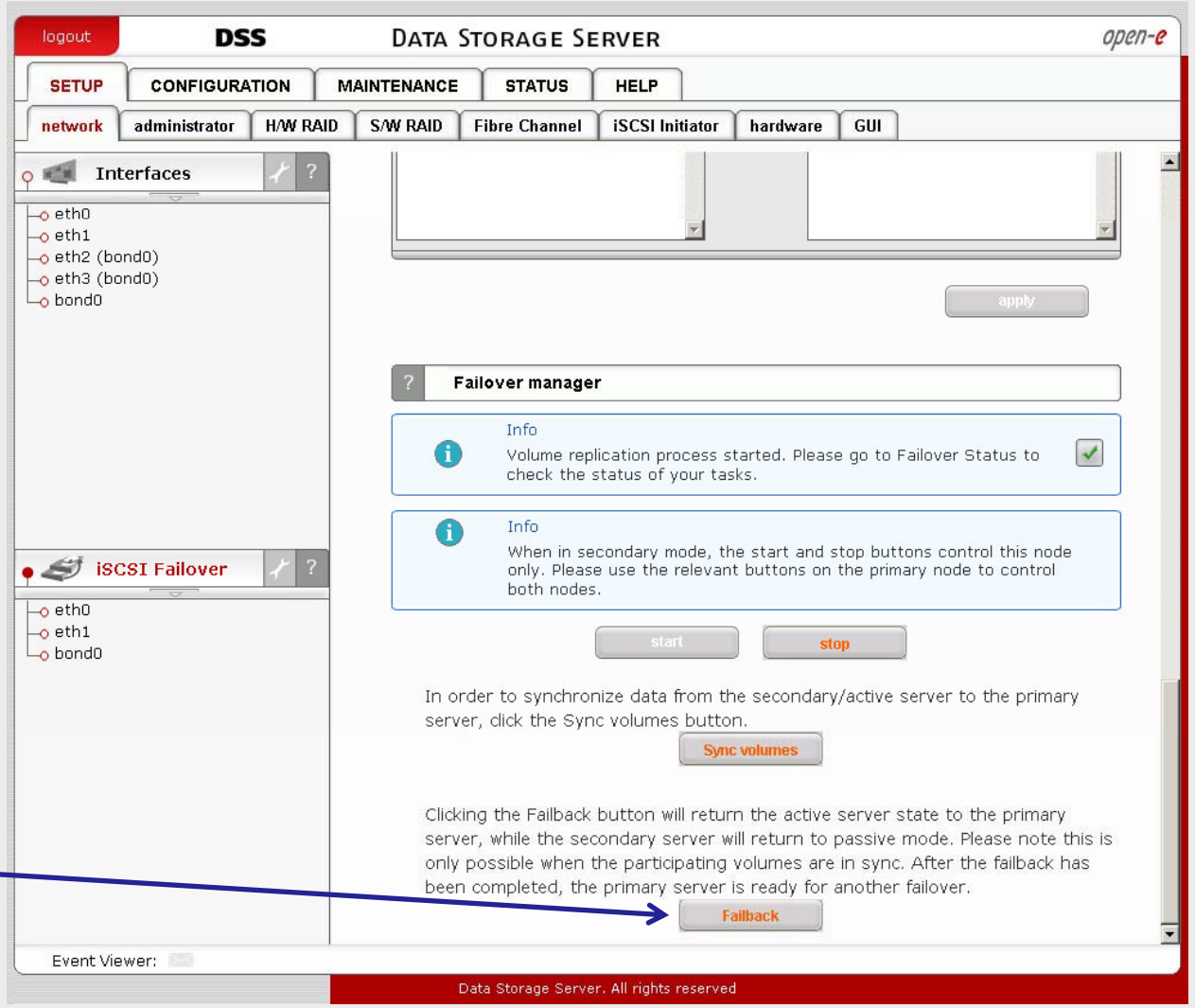


Synchronous Volume Replication with Failover over a LAN



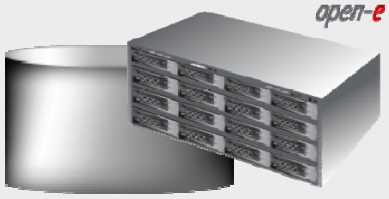
Data Server (DSS2)
Secondary node
Address IP:192.168.0.221

10. Run Failback Function



In order to return the active server state to the Primary server click on the Failback button

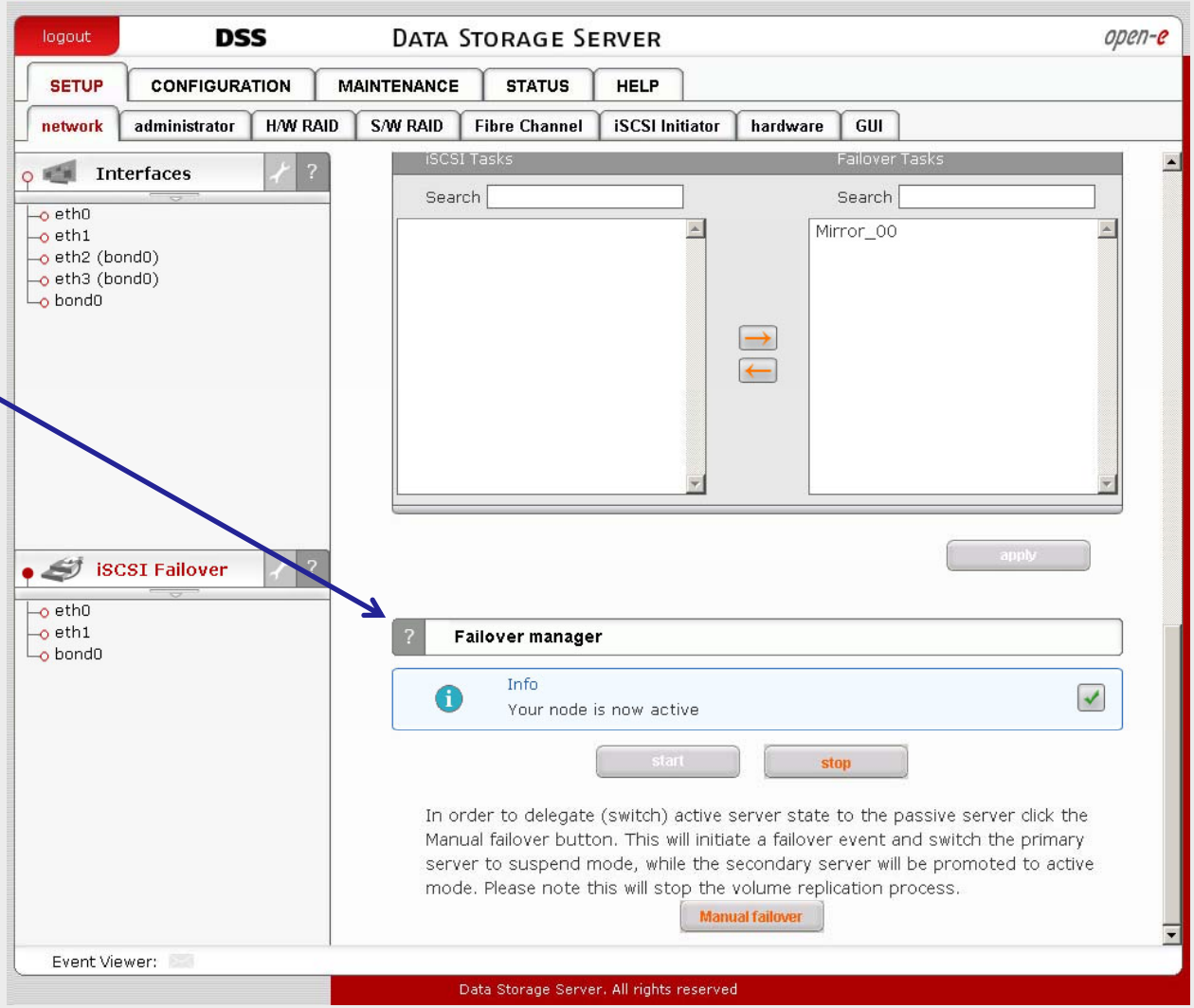
Synchronous Volume Replication with Failover over a LAN



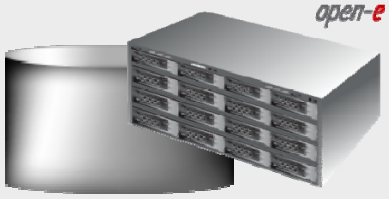
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

10. Run Failback Function

After clicking on Failback button (in Failover manager function on Secondary node) Primary node is now active.



Synchronous Volume Replication with Failover over a LAN



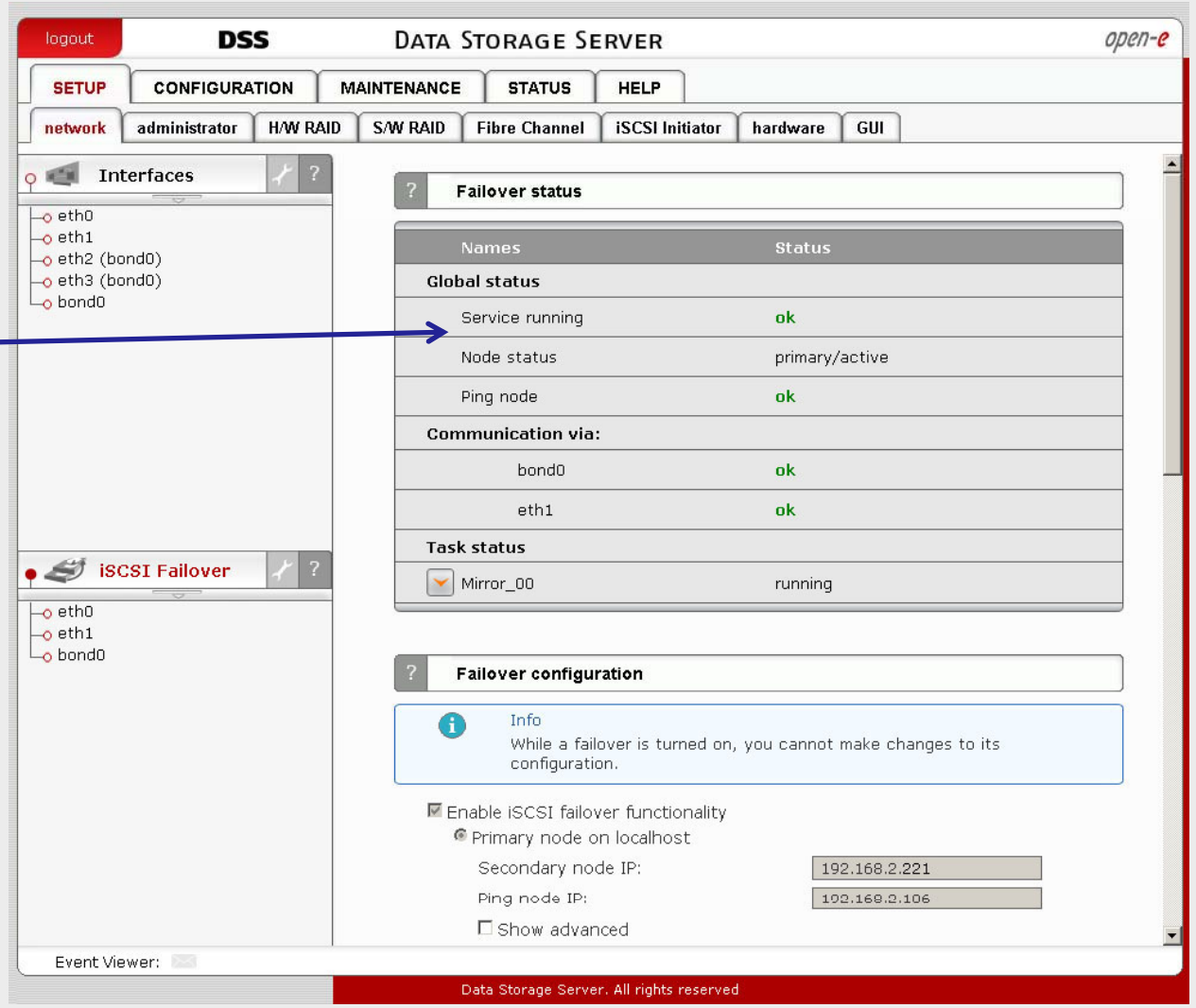
Data Server (DSS1)
Primary node
Address IP:192.168.0.220

10. Run Failback Function

Primary node is active again and ready for Failover.

iSCSI Failover/Volume Replication

The configuration and testing of iSCSI Failover/Failback is now complete.



Thank You!